EXHIBIT 5

to the Declaration of
Dean M. Harvey in Support of
Plaintiffs' Opposition Briefs

REDACTED VERSION

IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF CALIFORNIA
SAN JOSE DIVISION

CONFIDENTIAL – TO BE FILED UNDER SEAL
SUBJECT TO PROTECTIVE ORDER

IN RE: HIGH-TECH EMPLOYEES ANTITRUST LITIGATION	**No. 11-CV-2509-LHK**
_____	
THIS DOCUMENT RELATES TO:	
ALL ACTIONS	

REPLY EXPERT REPORT OF EDWARD E. LEAMER, PH.D.

December 10, 2012

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I. Introduction, Assignment, and Summary of Conclusions

1. I have been asked by counsel for Class Plaintiffs in this matter to review the Report and Deposition of Defendants' expert Dr. Murphy and reply to his comments that bear on the conclusions in my Original Report. A list of materials I have relied upon (in addition to those listed in my original report) is provided in Exhibit 1.

2. Dr. Murphy lists five opinions in his summary that can be combined into three principal categories:[1] In this report I explain why each of these opinions of Dr. Murphy is in error. I stand by the conclusions in my original report, namely that common theoretical, documentary and quantitative evidence can be used to prove the common impact of the agreements on class members.

3. My summaries of Dr. Murphy's three central opinions and summaries of my rebuttal arguments are as follows:

4. Murphy Opinion:[2] As a matter of economic theory, the agreements are too limited and too inconsequential to matter at all, given the multiple methods by which firms recruit workers, and given the small fraction of overall hiring that was covered by the agreements, and given the small number of inter-defendant transfers from 2001 to 2011.

5. Rebuttal: (1) The market equilibrium models to which Dr. Murphy refers are not applicable to Defendants' agreements because these models assume perfect knowledge, whereas the direct effect of the agreements was to reduce the information available about outside opportunities. While models of market equilibrium which assume perfect information imply that the agreements might be inconsequential, models with imperfect information allow for the possibility or even the likelihood that small changes in the information flow have large consequences. (2) The cold calling that was suppressed in principle would have provided better information in a more timely way than any other information channel. (3) For wages to respond to outside competition what matters is mobility, not movement of workers. The amount of hiring and the amount of inter-defendant movement is an

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[1] Expert Report of Kevin M. Murphy, November 12, 2012 (the "Murphy Report"), pp.6-13.

[2] Murphy Report, pp.6-8.

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unreliable indictor of mobility, since there can be mobility without movement and there can also be movement without mobility, for example, when a worker is fired.

6.   Murphy Opinion:[3] Whatever impact there might have been on a few individuals, this effect was not spread across all or most members of the proposed classes because these firms do not allow internal equity concerns (fairness and revenue sharing) to play a role in the determination of compensation of employees. In particular, the "common factor" regressions that Leamer reports do not establish that internal equity mattered.

7.   Rebuttal: (1) The fact that "fairness" and internal equity can affect compensation is clearly established in the economics literature. (2) The fact that fairness and internal equity actually did affect compensation at the seven Defendants is clearly established by the HR documents and depositions of the Defendants, and also by Google's decision in 2010 to do an across-the-board increase in base salaries by 10 percent in response to a relatively small loss of workers to Facebook. (3) My common factor regressions are consistent with a "somewhat rigid" compensation system but are not by themselves a proof of fairness effects. These regressions confirm the hierarchical title/grade method of determining compensation that all of the Defendant firms used. This hierarchical compensation structure allows the force of fairness to play a role in setting compensation levels, something that is established in the economics literature.[4]

8.   Murphy Opinion:[5] Neither Leamer's conduct regression model nor any other similar regression model based on data from the proposed classes can be relied upon to determine the effects of the agreements because the regression model has residuals and because the estimates change "too much" when new variables are added into the equation.

9.   Rebuttal: (1) The method of regression is a completely standard way of carrying out a damage analysis. (2) The existence of unexplained residuals, large or small,

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[3] Murphy Report, p.10.

[4] See e.g., Rees, A. "The Role of Fairness in Wage Determination," *Journal of Labor Economics,* 1993, Vol. 11, No. 1, pt. 1.

[5] Murphy Report, p. 11.

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does not in any way invalidate the method of regression. (3) Estimated regression models will almost always change when new variables are added. (4) Dr. Murphy's modifications to my conduct regression (defendant disaggregation, and regression with subsets) more than exhaust the information in the data set and are predetermined to produce wild results. (5) The other variable that Murphy explores (the S&P 500) illustrates that nonsense variables can also produce wild results. Dr. Murphy uses the S&P index's annual closing value in his estimation, as opposed to the annual average of the S&P index. By making this choice, he implies that compensation decisions throughout the year depend only on the end-of-year level of the index, nothing in between, and do so with perfect foresight. More importantly, this variable doesn't belong in this equation because the link between the S&P index and compensation at the seven Defendants is very remote, given the other control variables in my equation.

II.   Dr. Murphy Has No Sound Basis for His Conclusion that the Agreements Did Not Materially Limit Information about Outside Opportunities

10.   Dr. Murphy's conclusion that information about outside opportunities was not limited by the agreements is based on an unsupported assumption and an irrelevant fact. Absent any data regarding the breadth or frequency of cold calling, or any way of measuring the amount of information provided by cold calls compared with other sources, Dr. Murphy merely assumes either that the cold calls provided redundant information because of the amount of hiring not covered by the agreements or he assumes that the prevented cold calls were replaced with other information flows. Absent any evidence about the effects of the agreements on mobility of the affected workers, Dr. Murphy uses an unreliable proxy for mobility, the level of inter-Defendant hiring.[6]

A.   **Dr. Murphy Has No Basis to Support His Assertion That Other Channels of Information Are More Important than Cold Calling**

11.   Dr. Murphy's first proposition, that "cold-calling" accounted for a small amount of Defendants' hiring activity is founded on little more than an irrelevant anecdote collected in an unscientific and unrepresentative "survey" of Defendants' HR

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[6] Murphy Report, ¶ 27.

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employees hand-picked by lawyers, and it reveals nothing about the importance of cold calling in the provision of information.

12.   Cold-calling is a distinct and special channel of information that accesses job candidates who otherwise would be left unaware of attractive opportunities. The record does not indicate that there are close substitutes for cold calling, and Dr. Murphy's unscientific surveys of a group of Defendant HR employees has produced nothing to the contrary. What he has learned is only that there are other means of recruiting:

> "But nonetheless, I think a number of the individuals from the various companies gave some quantitative assessments in their declarations and in their discussions. They talked about the fraction of people hired through various means." [7]

13.   Dr. Murphy's reference to vague information about the fractions of people hired by various methods tells us nothing about what was irretrievably lost when the anti-cold-calling agreements were put in place, if anything. By relying on a few interviews to conclude that the anti-cold-calling agreements had little or no impact on the information flow, Dr. Murphy effectively assumes that the information conveyed by Google's hiring activities at a college job fair, for example, is a perfect substitute for cold-calls by Google to Apple employees.[8] As I describe below, this unlikely hypothesis would need to be tested, which Dr. Murphy has not done.

14.   Dr. Murphy says that the data do not exist to test his hypothesis.[9] Instead, Dr. Murphy's basis seems little more than that Defendants' employees told him that referrals account for a much larger percentage of hiring than "cold-calling." One of the many problems with this approach is that Dr. Murphy redefines the alleged conduct covered by the agreements to exclude referrals and to apply only to "totally passive candidate[s]" who had not in any way expressed interest in new

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[7] Murphy Deposition, pp. 61-62.

[8] Deposition of Kevin M. Murphy, Ph.D., December 3, 2012 (Murphy Deposition), p. 127.

[9] Murphy Report, p. 17, fn. 31.

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employment.[10] But, as I described in my report, the agreements are alleged to have prohibited cross-solicitation of the parties' employees in any manner, whether as a result of a referral or not and whether recruiters identified potential candidates via networking websites such as LinkedIn or not.[11] As I understand it, these agreements applied to all recruiters who were either directly employed by or were headhunters hired by the agreeing firms.[12] Some of the agreements apparently went further, prohibiting hiring, requiring notification of hires, and prohibiting counteroffers.[13]

15.   The agreements also applied to employee referrals. Adobe senior executives made their understanding clear at the time. When the question arose "if an Adobe employee refers an Apple employee through our employee referral program are you okay with that?" the answer that Bruce Chizen, CEO of Adobe agreed with was, "I think the spirit has to be that **we don't initiate contact with Apple employees even**

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[10] Murphy Report, pp. 3-4, fn. 8.

[11] See Expert Report of Edward E. Leamer, Ph.D., October 1, 2012 ("Leamer Report" or "my Report"), ¶ 23.

[12] See e.g., 231APPLE001164, GOOG-HIGH TECH-00023500-601 at 520-528, and PIX00000400.

[13] When present, this provision applied even when an employee initiated contact. See, e.g., 76577DOC000464. Even if certain agreements may not have begun with this express provision, they often operated in this manner in practice. For example, Pixar and Google sought Steve Jobs's permission before making offers to Apple employees. See PIX00006025; 231APPLE002151. Apple refused to consider Adobe employees unless they first left employment with Adobe. See 231APPLE080776 ("This is a response I received from an ADOBE employee who applied for a position through our job posting site. I called him to ensure he is still an ADOBE employee, explained our mutual agreement / guidelines, and asked that he contact me should his employment with ADOBE terminate, but at this time I am unable to continue exploring with him. . . . I do not want anything in 'writing'.") Apple also attempted to enter into a "no hire" agreement with Palm, which Palm's CEO Ed Colligan rejected. See PALM00005 – 008 at 006 and PALM00022 – 027 at 024. See also, 231APPLE002153 - 154, and 231APPLE002214. See also, PIX00000400; GOOG-HIGH TECH-00056790 and PIX00004051 ("We just won't get into bidding wars" for employees.); LUCAS00013507 ("We have agreed we want to avoid bidding wars.").

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        through our employees."[14] [emphasis added] Google and Pixar documents also show this to be the case.[15]

16.   The agreements affected the recruiting of even "non-passive candidates" i.e. those who were actively searching and who submitted applications in response to job postings or posted their resumes on the companies' websites. Notice was given regardless of who initiated contact, as Google did before making an offer to an Intel employee who had not been cold-called.[16] Notice also had to be given to Apple by Pixar before making an offer to an Apple employee ("My understanding was in order for us to consider an Apple employee as a candidate, we couldn't make an offer without letting Steve Jobs know").[17] The same arrangement existed between Pixar and Intel.[18]

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[14] See ADOBE_001096-97 at 96.

[15] Google enforced its "Do Not Call" agreements in the same way. "The key is the DNC candidate is initiating the 'I am looking' and there is written proof." This included employee referrals: "All Googlers fall under the same DNC rules." "If the Googler did reach out and initiate first contact (e.g., at a cocktail party) then we should walk away and not pursue the lead." GOOG-HIGH TECH-00009270-276 at 270. See also Deposition of Arnnon Geshuri, August 17, 2012 at 187:25-189:1. Also see PIX00009271-72 at71 "You could check in, invite her over for coffee, see if she offers up any opening. If she did, we could talk to her, If not, we'd have to respect the truce."

[16] In August of 2006, Campbell agreed with Google's Jonathon Rosenberg (Senior Vice President of Product Management) that Google should call Otellini before making an offer to an Intel employee, regardless of whether the Intel employee first approached Google. Shaver Decl., Ex. 37 [GOOG-HIGH TECH-00056790] (Rosenberg: "Campbell and I already discussed this [talking to Intel before making an offer to an Intel employee] and agreed that either way [whether Intel was treated as a "Do Not Call" company, or a "sensitive" company] I should give a courtesy call to Paul Otellini. I'm meeting with [the Intel candidate] tomorrow and I will ask him how he wants to handle communication to Intel management before we even get to the stage of specifically discussing an offer.").

[17] Deposition of Pamela Zissimos, November 13, 2012 at 125:6-8.

[18] "We cannot recruit (including calling up, emailing or enticing in any way) current Pixar employees to come work for Intel. If a Pixar employee applies to Intel without being recruited by Intel, contact Pat Gelsinger [a Senior VP at Intel] and explain to him a Pixar employee (provide the candidates [sic] name) has applied to Intel without being recruited and he will he will [sic] contact the CEO of Pixar for approval to hire." 76577DOC000464-466 at 466.

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17.   Hence, Dr. Murphy fails to acknowledge the full scope of the agreements and does not recognize that these agreements directly affected more than just "totally passive" employees. He therefore has no basis for the first thing he says we need to know to understand the agreements.

18.   Moreover, debating or defining the scope of the agreements is not a proper exercise for an economist. I studied the agreements to have a factual background for statistical methods that I used to measure their effects empirically. Their actual meaning or scope will presumably be determined someday in a court of law. If Dr. Murphy's opinion depends on his own evaluation of the true meaning of the agreements based on self-serving interviews with Defendant employees, then the first step in his formation of an opinion is not based on economic expertise.

B. **Dr. Murphy Incorrectly Assumes that Inter-Defendant Hiring Produces Information that is Equivalent to Cold-Calling**

19.   Dr. Murphy's attempt to determine the effect of the agreements based on the level of inter-Defendant hiring is similarly unfounded. Dr. Murphy asserts that:

> If hiring by one Defendant of employees from another Defendant were economically important in the price-discovery process, then employee movement between Defendants should account for a substantial part of the overall movement of workers.[19]

20.   Dr. Murphy's support for this assertion is in footnote 35:

> Hiring should be a reasonable proxy for the price discovery process given that information on compensation is most commonly provided to candidates only at the later stages of the recruiting process (once the number of candidates has been reduced to a small group that then is interviewed for a job or job opening). Both Adobe and Intuit clearly state that they do not discuss compensation until the later stages of the recruiting process.[20]

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[19] Murphy Report, ¶ 31.

[20] See Declaration of Jeff Vijungco, November 9, 2012 at pp. 5-6 and Declaration of Chris Galy

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21.   This is Dr. Murphy's key justification for using inter-Defendant hiring to evaluate the agreements. It has no foundation in economic theory or fact.

22.   As Dr. Murphy acknowledged at his deposition a cold-call can transmit information about compensation to a candidate regardless of whether the recruiter makes a concrete salary offer.[21] If the recruiter assesses the market value of the position, this conveys information; if the recruiter provides feedback about the candidate's salary expectations, this conveys information; if the recruiter even calls the candidate back after he or she has stated salary expectations, this conveys information. Most recruiters are well aware of salary levels and ranges at competing firms since companies routinely survey compensation levels at their labor market competitors. Employees on the other hand aren't equally aware of salary distributions or of the precise skill sets valued in other firms. That asymmetric information is partly remedied by the cold call alone. The very fact that a recruiter initiated contact and expressed interest in an employee provides a signal to the employee that he may be under-placed or that his skills may be under-valued at the current employer and that there are might be better opportunities elsewhere.

C. **Dr. Murphy Does Not Understand the Important Difference between Movement and Mobility**

23.   Dr. Murphy's opinions indicate he has little or no understanding of the important difference between movement and mobility. As opposed to actual movement, i.e., an employee leaving one firm and joining another, mobility is a reflection of employees' satisfaction or lack thereof with compensation at their current firms and recognition or understanding of the availability of other employment opportunities. Cold calling enhances mobility, without necessarily creating movement. Contrary to what seems the basis for Dr. Murphy's opinions, movement is a very imperfect and unreliable symptom of mobility because while one possible result of increased mobility is more movement, another involves firms' *enhancing compensation to prevent movement*. In other words, evidence of a lack of movement is entirely consistent with my findings that class-wide evidence is capable of showing that in the absence of Defendants' agreements, Class member compensation would have

November 9, 2012 (Galy Declaration) at pp. 3-4.

[21] Murphy Deposition, pp. 135-136.

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been broadly higher. Thus, Dr. Murphy's first three opinions are speculations, lacking empirical support.

24.   The important elements in the distinction between movement and mobility are:

a.   Movement refers to the departures and arrivals of workers at firms. Mobility is the credible threat of movement if a better offer were to materialize.

b.   Mobility between firms puts pressure on each firm to offer compensation packages that are attractive enough to retain employees. If workers were completely immobile, potential external competition for existing workers could not materialize as a force for higher compensation. If workers were perfectly and instantaneously mobile, then firms would be compelled to match outside opportunities on a day by day basis in order to retain employees. Normal, unimpeded mobility lies somewhere between these two extremes, greater for some kinds of workers and less for others.

c.   Mobility is impaired by lack of information. Recruiters target the so-called "passive" candidates with cold-calling because that passivity is likely to leave the workers under-informed about outside opportunities. By providing information to under-informed workers cold-calling increases mobility.

d.   Movement is evident in the payroll records but mobility is not directly observable. Movement is a possible correlate of mobility, but not reliably so because most swings in movement come from other sources. Not surprisingly the anti-cold-calling agreements were put in place in 2005 when the market for tech workers was heating up again after the 2001 tech bust.[22] Whatever suppressive impact the agreements had on mobility was masked by the coincident unpredictable rise in movement.

e.   There can be mobility without movement. Indeed, in response to outside offers, firms routinely counteroffer to try to retain valuable employees. If the response is adequate, there is mobility without movement and a wage response without movement as well.

f.   There can be changes in movement without changes in mobility.

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[22] Luo, T. and A. Mann, "Crash and Reboot: Silicon Valley high-tech employment and wages, 2000-08," Monthly Labor Review, January 2010, pp. 61-65 .

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1. Involuntary separations create movement with or without mobility. Separations initiated by a firm either because of substandard performance of the individual or because of reductions-in-force are not likely to create upward pressure on wages of the workers who stay behind. These separations are obviously not symptoms of mobility of the affected workers.

2. There are also a variety of worker-chosen separations that have nothing to do with getting a better job. Health problems and retirement are obvious instances. Family matters like a spouse getting an attractive job offer in a different city or the desire to be closer to aging parents can also create separations.

25. The agreements had their effect by reducing the information flow about outside opportunities, and thus reducing the mobility of workers as well as their perceptions of the equitable wage within their firm. Dr. Murphy has provided no reliable support for his apparent opinion that the agreements did not substantially reduce the information flow to passive experienced workers who were satisfied with their jobs and not actively engaged in a search for alternatives.

D. **Dr. Murphy Understates the Information Provided by Cold Calling**

26. Dr. Murphy's factual assertion—that recruiters do not discuss compensation with candidates until late in the recruitment process[23]—also has no empirical support. He relies on two declarations and conversations with Defendant employees for which there are no notes.[24] But even these information sources are contradictory: the Galy Declaration he relies on states that recruiters do discuss compensation with recruits.[25] Even Dr. Murphy admitted at his deposition that this happens.[26]

27. This is the problem with relying on sources such as these and "casual empiricism" to draw empirical conclusions. An economist qualified and trained in survey-based research could have designed and administered a survey of recruiters at the

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[23] Murphy Report, fn. 35.

[24] Id.

[25] Galy Declaration, ¶ 15.

[26] Murphy Deposition, p. 136.

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Defendants, like the survey administered in one of Dr. Murphy's sources.[27]   Such work might have been informative, if properly executed. However, there is little or no useful economic evidence on which to base empirical conclusions in unstructured conversations with interested persons. Some economists use interviews with industry participants to frame exercises in symbolic theory; they expressly disclaim using them as a basis for empirical conclusions and they admit their "methodology…moves beyond the boundary of economics itself into the realm of anthropology and the territory of hermeneutics[.]"[28]

E.   **Dr. Murphy's Analysis of Defendants' Hiring Is Irrelevant and His Conclusion from It of No Effect on Compensation Is Unsupported**

28.   Dr. Murphy also argues that "my claim that average compensation at these firms was suppressed is implausible because of the high level of hiring by Defendants during the class period."[29] The only support offered by Dr. Murphy for this opinion is the rate of movement of workers to the Defendants: "Collectively, between 2005 and 2009, Defendants hired an average of over 8,000 new workers per year – equal to 11 percent of their combined workforces."[30]

29.   This single fact is irrelevant to his sweeping conclusion. There is no inconsistency between the levels of hiring by Defendants during the class period and my conclusion that there is reliable class-wide evidence capable of showing that Defendants' under-compensated employees as a result of the agreements.

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[27] Honoree, A. I. and D. E. Terpstra. "The Relative Importance of External, Internal, Individual and Procedural Equity to Pay Satisfaction," Compensation & Benefits Review, November/December 2003. Dr. Murphy was apparently unacquainted with any written standards for survey design or mixed methods (qualitative and quantitative) research prior to undertaking it. See, e.g., Creswell, J. W., and V. L. Plano Clark, Designing and Conducting Mixed Methods Research, SAGE Publication: 2007, Chapter 6.; Creswell, J. W., Research Design: Qualitative, Quantitative, and Mixed Methods Approaches, SAGE: 2009, Chapter 9.

[28] Piore, M. J., "Qualitative Research: Does It Fit In Economics?," *European Management Review*, (2006) 3, 17-23.

[29] Murphy Report, p. 6.

[30] Id.

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30.   Dr. Murphy appears to miss or misunderstand the following key facts about hiring
        and cold-calling:

    a.   Much of the Defendants' hiring volume was at entry levels. The
            information conveyed by the hiring of an entry level employee at the entry
            level rate in the firm's compensation structure is not comparable to the
            information conveyed in a cold call of an experienced worker by a
            competitor.

    b.   When firms hire a new employee they have control over the internal
            disruption that a new employee with exceptional compensation might
            cause. This disruption can be minimized by slotting a new employee into
            an appropriate title-compensation combination in the firm's hierarchy, and
            by offering one-time signing bonuses, thus leaving the new employees
            appropriately located in the hierarchy going forward. Defendants' new
            employees could be slotted into a "comfortable" place in the internal
            hierarchy with compensation comparable to other employees.

    c.   Although firms can exercise control over the contracts offered to new
            employees, they do not have control over cold-calls and departures to
            better positions, unless they enter into illegal agreements. Thus, as far as
            movement is concerned, the focus should be more on the impact of
            departures to better positions rather than hiring. As described above and in
            my original report, Defendants clearly found departures highly
            disruptive.[31]

    d.   I accommodated the potential significance of differences in the rate of
            hiring by embodying it in my conduct regression.[32]

        1. My conduct regression explicitly allows for the possibility that
            high levels of firm hiring affect the amount of undercompensation
            caused by the agreements.

        2. My conduct regression explicitly allows for the possibility that the
            effect on compensation levels is different for young employees and
            for employees with short tenure at their firms, and so the effect of
            the agreements on employees at a firm might vary according to the

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[31] Leamer Report, pp. 34 and 45.

[32] Leamer Report, Figure 20.

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firm's composition in this regard. These are workers who, as a group, might be less likely to be cold-called.

31.   The bottom line is that Dr. Murphy's characterization of the significance of Defendants' hiring is misleading and mistaken.

F. **Dr. Murphy Has Not Disputed that the Agreements Reduced Cold-Calling and Competition Among the Defendants for Employees**

32.   As described above, documents show Defendant executives' frustration with cold-calling when it occurred, whether or not it resulted in a poached employee. They wanted to stop it, and actively undertook procedures at the highest levels to do so. Dr. Murphy has not disputed this. Dr. Murphy has not addressed the effectiveness of the agreements in actually deterring cold calling. As I described in my Report,[33] documents indicate that CEOs of the Defendant firms placed a priority on ensuring compliance.[34]

33.   Thus it is undisputed that but for the agreements some workers would have otherwise learned that a competitor would have been willing to pay higher salaries than the worker was currently receiving. Some of these workers would likely have accepted the higher wage, or used this information to negotiate a higher salary from their employer, and told colleagues about the alternative employment opportunities.

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[33] Leamer Report, ¶ 39

[34] See, e.g., GOOG-HIGH TECH-00009454-9454 at 9454 (Email from Apple showing concern about poaching from Google and assurance from Eric Schmidt that the employee responsible would be terminated from Google), 231APPLE002140 (Bill Campbell assures Steve Jobs that Dave from Apple would not accept Google's offer as they stopped the hiring process for two other people from Dave's team), and 231APPLE002145 (Bruce Chizen forwards an Adobe email to Steve Jobs showing that Jerry from Adobe has been asked to back off from soliciting the one person he was after from Apple).

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     G. **Dr. Murphy Incorrectly Argues that Interference in the Information Flow Would Not Affect Compensation At All**

34.   In addition to asserting incorrectly that the agreements could not affect the information flow about outside opportunities, Dr. Murphy argues the impact on compensation would have been nil, or even positive because:[35]

    a.   The agreements were not broad enough to affect the "market price."

    b.   "As a matter of economic theory, the alleged conspiracy to restrict a small number of employers from using a single recruiting tool when approaching employees at one or a few other firms would not lower compensation on a class-wide basis."[36]

    c.   "As a matter of economics, reduced cold calling (to the extent it has an effect) could raise, rather than reduce, average compensation. If less cold calling reduced the number of potential candidates contacted by Defendants, it would reduce the pool of potential hires for those Defendants."[37]

35.   These comments are a highly selective and misleading characterization of the state of economy theory.

36.   The reference to market prices in item (a) is startling and suggests that Dr. Murphy ignored what I said in my report. My findings about the effect of the agreements on compensation relate to the price-discovery *process* that was impeded by the anti-cold-calling agreements. I do not rely on the notion that the equilibrium market price is affected by the agreements. What I argue instead is that the whole sequence of contracts in search of that market price is affected. This is why market definition and market price are not relevant inquiries here: the process of getting to a market price across markets, across firms, and for all employees was disrupted by the agreements. Dr. Murphy's commentary about market prices and equilibrium is thus irrelevant.

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[35] Murphy Report, pp. 9-10.

[36] Murphy Report, p. 9.

[37] Murphy Report, p. 10.

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37.   The reference to economic theory in item (b) is also startling. While there may be
       some assumptions that are able to produce the result Dr. Murphy claims, other
       assumptions—widely accepted in the economic literature—imply the opposite. In
       particular, Dr. Murphy's assertion regarding the supposedly limited nature of the
       recruiting restriction at issue in the agreements is at odds with widely accepted
       economic research into the workings of markets with less-than-perfect (imperfect)
       information. Contradicting Dr. Murphy, here is what Nobel Prize Winner Joseph
       Stiglitz wrote in an article cited in my previous report (emphasis added):

>   "For more than 100 years, formal modeling in economics
>   had focused on models in which information was assumed
>   to be perfect. Of course, everyone recognized that
>   information was in fact imperfect, but the hope, following
>   Marshall's dictum 'Natura non facit saltum,' was that
>   economies in which information was not too imperfect
>   would look very much like economies in which information
>   was perfect. One of the main results of our research was to
>   show that this was not true; that **even a small amount of
>   information imperfection could have a profound effect
>   on the nature of the equilibrium**."[38]

38.   It is not just the work of Dr. Stiglitz that Dr. Murphy has failed to appreciate. Two
       other recent Nobel Prize winners have also done work on the consequences of
       imperfect information. Vernon L. Smith won the 2002 Nobel Prize "*for having
       established laboratory experiments as a tool in empirical economic analysis,
       especially in the study of alternative market mechanisms.*"[39] These laboratory
       experiments study the price discovery process, with various informational
       limitations and transactions costs. Since I filed my report, Alvin Roth was awarded
       the 2012 Nobel Prize for "*for the theory of stable allocations and the practice of*

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[38] Stiglitz, J., "Information and the Change in the Paradigm in Economics," *The American Economic Review*, Vol. 92, No. 3 (June 2002), p. 461.

[39] "The Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel 2002," Nobelprize.org., December 10, 2012,
http://www.nobelprize.org/nobel_prizes/economics/laureates/2002/

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market design."[40] Here the words "market design" refer to a broad concept and would include restrictions on cold-calling.

39.   Dr. Murphy's item (c) is another reference to some unstated economic model that, according to Dr. Murphy, apparently says that if less-preferred cold-calling is substituted for the most-preferred cold calling, then workers are made better off. But it is not enough to claim that there is a theory that allows workers to be better off. What we need is some wisdom that offers advice on whether this is likely to be the case in the present context. I consider it highly unlikely that the Defendant firms would engage in these secret, illegal and egregious agreements if the agreements increased compensation for their workers.

40.   Dr. Murphy's logic violates a basic principle of modern economics, which he did not really dispute at his deposition:

> "The most fundamental reason that markets with imperfect information differ from those in which information is complete is that, with imperfect information, market actions or choices convey information."[41]

> "… The fact that actions convey information leads people to alter their behavior, and changes how markets function. This is why information imperfections have such profound effects."[42]

III.   Contrary to Dr. Murphy's Opinion Under-Compensation Would Have Impacted All or Almost All Class Members

41.   Dr. Murphy describes my opinion as follows:

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[40] "The Prize in Economic Sciences 2012," Nobelprize.org., December 10 2012, http://www.nobelprize.org/nobel_prizes/economics/laureates/2012/

[41] Stiglitz, J., "Information and the Change in the Paradigm in Economics," *The American Economic Review*, Vol. 92, No. 3 (June 2002), p. 468.

[42] Stiglitz, J., "Information and the Change in the Paradigm in Economics," *The American Economic Review*, Vol. 92, No. 3 (June 2002), p. 473.

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> "Dr. Leamer's analysis has three essential steps. First, the
> challenged agreements must materially reduce the
> information available to Defendants' employees. Second,
> that reduction in information must cause the salaries of
> individual employees to be reduced. Third, the "somewhat
> rigid" compensation structures of the Defendants must
> cause the reductions in the compensation of some
> employees to reduce compensation on a class-wide
> basis."[43]

42.   Dr. Murphy claims that "[n]one of the required links in the chain hold, let alone all
        three."[44] However he has left major elements of these three steps unanswered, has
        made substantial errors in his characterization of the economics of the case, has
        ignored or mischaracterized evidence, and as a result has failed to support his claim
        that there would be no substantial or class-wide impact from the Defendants'
        agreements.

43.   The previous section has addressed the very substantial economic theory and
        documentary evidence that supports (1) the finding that the agreements limited
        information about outside opportunities and (2) suppressed compensation of
        affected workers. With regard to the third step in Dr. Murphy's characterization of
        my opinion–that these firms have a somewhat rigid salary structure that spreads the
        harm to all or almost all employees –Dr. Murphy sometimes disagrees but it is a
        great surprise to discover that when he feels his argument is strengthened by the
        opposite opinion, he changes his mind.

44.   As Murphy puts it: "**He [Leamer] failed to take into account when performing
        his statistical test that, aside from the challenged agreements, employees at a
        firm are affected by common factors that influence their compensation – e.g., a
        highly successful movie at Pixar can result in large and unusual bonuses for all
        Pixar employees, or a short-term reduction in the demand for PCs and the**

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[43] Murphy Report, p. 5

[44] Murphy Report, p. 6.

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microprocessors that power them can cause a decline in Intel's revenue and profitability and lead Intel to impose a wage freeze such as occurred in 2009."[45]

45.   I quite agree with the second Dr. Murphy on this.

   A. **There is Ample Evidence in the Defendants' Documents and Depositions that Internal Equity Played a Key Role in Wage Setting.**

46.   The proposition that these firms allowed salaries to be influenced by internal equity considerations is clear from Defendant HR documents and from depositions of their HR personnel. For example, managers at Apple take internal equity into careful consideration on top of performance when making a merit decision to determine an existing employee's merit increase.[46] Similar approaches are used by other Defendants, where internal equity is assessed and equity report is run prior to making offers, merit increases and promotions.[47] Internal equity played an important role during the negotiation processes for all Defendants, e.g., Apple had to extend an offer that was lower than what a candidate was getting at his previous job due to internal equity,[48] and while a hiring manager at Adobe stated that while he does not subscribe to the 'internal equity' issue which assumes "all people are created equal," he understands the sensitivity, and hence suggested spot-on bonuses for a candidate if an increase in base salary offer would skew internal equity.[49]

47.   One expression of internal equity and fairness in Defendants' compensation practices is their adoption and adherence to compensation structures. These structures played a substantial role in decisions regarding hiring, promotions, salary raises,[50] and even demotions or lateral movements.[51] Numerous Defendant

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[45] Murphy Report, ¶ 124 (emphasis added).

[46] See 231APPLE094041-67 at 50.

[47] See e.g., 76512DOC000926, ADOBE_009327, ADOBE_016608, GOOG-HIGH TECH-00036370, GOOG-HIGH-TECH-00233026, LUCAS00004721 and PIX00023020.

[48] See 231APPLE056385.

[49] See ADOBE_002764.

[50] See e.g., 76582DOC000902 (Intel follows a pay line guideline when making changes to employees' salaries).

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documents show the significance Defendants gave to their compensation structure.[52] Even Defendants' hand-picked declaration witnesses discuss the importance of their firms' salary structures.[53]

48.   While Dr. Murphy argues that the compensation systems of the Defendants rely on "individual performance and other individual characteristics to determine compensation changes," [54] and that based on Defendants' declarations and his interviews with the compensation managers there is "substantial flexibility delegated to individual merit,"[55] he does not dispute that firms use internal equity when it comes to determining compensation.[56] He merely tries to downplay its importance. The Defendant documents described above and in my report indicate otherwise.[57]

B.   **There is Abundant Economics Literature on the Role of Fairness in Wage Setting**

49.   Dr. Murphy quibbles with some of my citations but he cannot deny and does not try to deny that there is an extensive and widely accepted economic literature regarding fairness and wage structures. As Nobel-prize winner Daniel Kahneman describes it in his bestselling book, Thinking Fast and Slow,[58] "More recent research has

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[51] See e.g., 76579DOC000714 (███████████████████████████████
██
████████████████").

[52] See e.g., LUCAS00035991, GOOG-HIGH-TECH-00195364, ADOBE_008047, ADOBE_008692, ADOBE_008098, ADOBE_008398, and PIX00000229.

[53] See Declaration of Danny McKell, November 12, 2012 at pp. 1-4; Declaration of Donna Morris, November 9, 2012 at pp. 2-7; Declaration of Steven Burmeister, November 12, 2012 at pp. 2-5; ; Declaration of Frank Wagner, November 9, 2012 at pp. 2-5; Declaration of Michelle Maupin, November 12, 2012 at p.6; Declaration of Lori McAdams, November 12, 2012 at pp. 2-3.

[54] Murphy Report, p. 44.

[55] Murphy Report, p. 45.

[56] Murphy Report, pp. 44-45.

[57] Leamer Report, pp. 49-52.

[58] Kahneman, D., Thinking, Fast and Slow, Farrar, Straus and Giroux, 2011, p. 308.

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supported the observations of reference-dependant fairness and also shown that fairness concerns are economically significant […]. Employers who violate rules of fairness are punished by reduced productivity, and merchants who follow unfair pricing policies can expect to lose sales."

a. Levine (1993)[59] surveyed 139 compensation executive at large US corporations to discern their attitudes towards fairness in wage structure. He found that the executives show strong preference to maintain constant relative wages and keep a stable wage structure within career paths and within broad occupational groups. In interviews these executives indicated reasons for maintaining relative pay, including:

   1. "There is a morale cost.... People complain."

   2. If you pay new workers more than senior ones, "You will have an employee revolt on your hands,"

   3. And employees start to "type up a resume, gossip."

   Even the companies that claimed to be market-driven agreed that changing 'relative' wages in response to market forces reduced morale and increased turnover.

b. Isaac (2001)[60] reviews literature and theory and finds support for the idea that pay-for-performance schemes are not effective if they do not maintain fairness (emphasis added):

   "**Labour is not a commodity.** Efficiency has a different time dimension and a different conceptual framework when dealing with the labour factor as compared to capital equipment or raw materials. **Labour is subject to complex social and psychological forces.** People are less receptive to direction than is a piece of equipment. They react to their environment. The pace and quality of work is critically dependent on their minds and hands. In

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[59] Levine, D. I., "Fairness, markets, and ability to pay: Evidence from compensation executives," *The American Economic Review*, Vol. 83, No. 5 (December 1993), pp. 1241-1259.

[60] Isaac, J. E. , "Performance related pay: The importance of fairness," *Journal of Industrial Relations*, Vol. 43, No. 2 (June 2001), pp. 111-123.

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their working environment, they are not individuals but form part of a group, open to group pressures and values. The place of work is not merely part of an economic process but also a social institution. And so is the labour market. **In such a context, people develop norms about what is right and wrong and fair.** Work is not merely a way to earn income. It has meaning in itself. The size of payment for work reflects on the worth, status and self-esteem of the person concerned. People measure their worth not in absolute terms but relative to one another. But while the financial incentive is important, people are also motivated by non-financial considerations.

This is not to deny the importance of the forces of supply and demand, but merely to point out that they work differently for the labour market compared to the commodity market; that the payment of a higher wage may not necessarily induce a better performance; and that **the determination of wages in a workplace or an industry is not an impersonal process but an administrative act in which norms of fairness must be given substantial weight in the interest of productive efficiency**. These norms are not necessarily immutable but the strength of convention into which notions of fairness are locked in, asserts itself when changes occur."

c.   Similarly, according to Fehr et al. (2009)[61]

"**[I]mportant labor market phenomena can be better understood if one takes (a) the inherent incompleteness and relational nature of most employment contracts and (b) the existence of reference-dependent fairness concerns among a substantial share of the population into account.** Theory shows and experiments confirm that, even if fairness concerns were to exert only weak effects in one-shot interactions, repeated interactions greatly magnify the relevance of such concerns on economic outcomes." (emphasis added)

d.   In a leading textbook on this topic, Milkovich, Newman and Gerhart[62] explain that many different factors influence a company's pay structure. These include,

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[61] Fehr, E., L. Goette and C. Zehnder, "A Behavioral Account of the Labor Market: The Role of Fairness Concerns," *Annual Review of Economics*, (2009), pp. 355-384.

[62] Gerhart, M., G. Milkovich and J. Newman, Compensation, New York: McGraw-Hill Irwin,

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but are not limited to, economic pressures, government policies and regulations, stockholders' attitudes and cultures and customs. "An important factor influencing the internal pay structure is its **acceptability to the employees involved**". Employees judge the fairness of their organization's internal pay structure by making several comparisons:

- Comparing to jobs similar to their own (internal alignment),

- Comparing their job to others at the same employer (internal alignment), and

- Comparing their jobs' pay against external pay levels (external competitiveness).

e. A seminal article by Hamermesh (1975)[63] develops a theoretical model that demonstrates the implications of changing relative wages when there is interdependence in utility (relative wage enters the utility function). "**Increases in one wage in a plant may affect the effort both of those workers receiving the increase and of other workers who are aware of it.**" The latter group reduces effort. "**The role of information is thus crucial to the analysis of interdependence.**" (emphasis added)

f. Di Maria & Metzler (2009)[64] analyze wage structure amongst workers at Luxemburg banks in 2002

"The main results indicate that some wage dispersion is needed to increase efficiency among workers who have similar characteristics and **a strong unequal wage structure between workers having different job positions will adversely affect efficiency in the bank**."

2011, Chapter 3.

[63] Hamermesh, D.S., "Interdependence in the labour market," *Economica*, (1975), pp. 420-429.

[64] Di Maria, C. H., and S. Metzler, *"*Internal Wage Structure and Bank Performance in Productivity in the Financial Services Sector," *The European Money and Finance Forum Vienna* (2009), Chapter 9.

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"..[A]mong workers sharing similar characteristics some wage disparity will also increase efficiency, but too much inequality will adversely affect efficiency and may even lower efficiency." (emphasis added)

g. Machin and Manning (2004)[65] put competitive labor market theory to a test by studying the market for care assistants in residential homes for the elderly on England's "sunshine coast." The authors find that the wage structure deviates in from what a theory of competitive labor market would predict. They find that wage dispersion is small within firms, but large between firms; and that the wage dispersion that is present does not seem to be explained by workers' productivity related characteristics.

C. **Class-Wide Evidence That Includes Google's "Big Bang" Response to Facebook Demonstrates How Competitive Pressure From One Peer Firm Can Move An Entire Pay Structure Overnight**

50. I described above how class-wide evidence is capable of showing that competitive pressure—when it was not impeded by the agreements—did result in substantial firm-wide compensation adjustments (including entry level and new employees[66]) in order to both retain high-quality workers and ensure all workers felt equitably compensated.

51. The most particular example of how this could affect class-wide compensation is Google's Big Bang, which illustrates all three of these impacts in action. In 2010, Google announced it would raise compensation to all employees by 10 percent and made other systematic compensation changes to retain employees in the face of poaching by Facebook. Defendants' top executives recognized that competitors' poaching could create important disruptions to the firms' compensation structures. As a result every Google employee (including new and entry level employees)

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[65] Machin, S. and A. Manning, "A test of competitive labor market theory: the wage structure among elder care assistants in the South of England," *ILRReview*, Vol. 57, No. 3 (April 2004), pp. 371- 385.

[66] Defendants mischaracterize my testimony regarding the agreements' impact on entry level and new employees. Defendants' Motion to Strike, November 12, 2012, pp. 4-5. As I described in my Report and deposition, firm-wide compensation structures imply that there would have been impact on all employees including entry level and new employees. Leamer Report, ¶ 120-134; Leamer Deposition, pp. 159:3-163:18.

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received a pay increase. The effects of the competitive pressure were felt beyond just Google and Facebook, other Defendants felt concern that they would need to increase their compensation in response to Google's increases.

52.   Although the opening sentence in my report discussing the event explained this significance clearly,[67] Dr. Murphy mischaracterizes the clear significance of Google's "Big Bang." He claims that its importance is that I "imply that the timing of the Big Bang ('approximately two months after the DOJ's antitrust investigation was made public') was a direct result of the ending of the alleged agreements."[68] He acknowledges that Google responded to the "challenge from Facebook by instituting a change in compensation" and that the objective of the firm-wide increase to all employees (including entry level employees) was "retaining talent against rapidly growing rivals."

53.   Dr. Murphy attempts to dismiss this event as "unique," but the bottom line remains that Google responded aggressively to poaching by a competitor who had hired only a very small fraction of Google employees over the preceding years (about ▮ employees,[69] less than ▮ percent). This small movement was the leading impetus for instigating a pay raise to more than 15,000 Google employees that Google estimated would cost it approximately $500 million.[70] This indicates that even a small number of moves can generate broad and far-reaching changes in compensation.[71]

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[67] "Facebook's aggressive efforts to recruit through Cold-Calling employees from Google in 2010 provide a particularly interesting example of the impact Cold-Calling can have on compensation firm-wide. Google recognized that it had become the target of substantial recruiting from Facebook." Leamer Report, p.45.

[68] Murphy Report, p. 42.

[69] GOOG-HIGH-TECH-00193435-446 at 436 ▮▮ .

[70] GOOG-HIGH-TECH-00194984-985 at 985.

[71] This contradicts Dr. Murphy's claim that my analysis "makes no economic sense" because "a rigid wage structure, even if one existed, could not imply that a change in compensation for one or more employees would shift the entire structure, because the cost of increasing compensation for one employee would be enormous (an increase for all employees), and would be resisted." See Murphy Report, p. 11.

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54.   Dr. Murphy claims that if a firm is broadly under-compensating its employees it
       will not be able to hire substantial numbers of new employees,[72] as if to suggest the
       converse that cold-calling could not much affect compensation at a firm that was
       hiring workers.   Google in 2011 is a clear counterexample. ███████████
       ████████ ██
       ███████ ██
       ████████████████████████████████.

55.   Furthermore, other firms, including Defendants Adobe, Apple, and Intuit, reacted to
       Google's "Big Bang" by considering that they might need to respond to this
       information about Google's compensation (though it was a relatively small percent
       of overall employment) by giving increases in their own employees'
       compensation.[74]

56.   Although the across the board salary increase by Google is distinct, it is not
       unusual.   With some exceptions, base salary increases were experienced by the vast
       majority of employees of all seven Defendants.   See Figure 1.

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[72] Murphy Report, pp. 6 and 34.

[73] Leamer Report, pp. 45-47, 49.

[74] See, e.g., ADOBE_025894-898 at 898 (internal discussion in which Adobe considers whether
its employees will want a raise similar to the one Google announced). See also, e.g.,
INTUIT_039098. (Campbell); 76616DOC005974 and "Google Board of Directors,"
http://investor.google.com/corporate/board-of-directors.html (Paul Otellini at Intel, who was a
Google Board Member throughout the conspiracy period).

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Figure 1: Percent of Employees Receiving a Base Salary Increase

Source: Defendants' employee compensation data.

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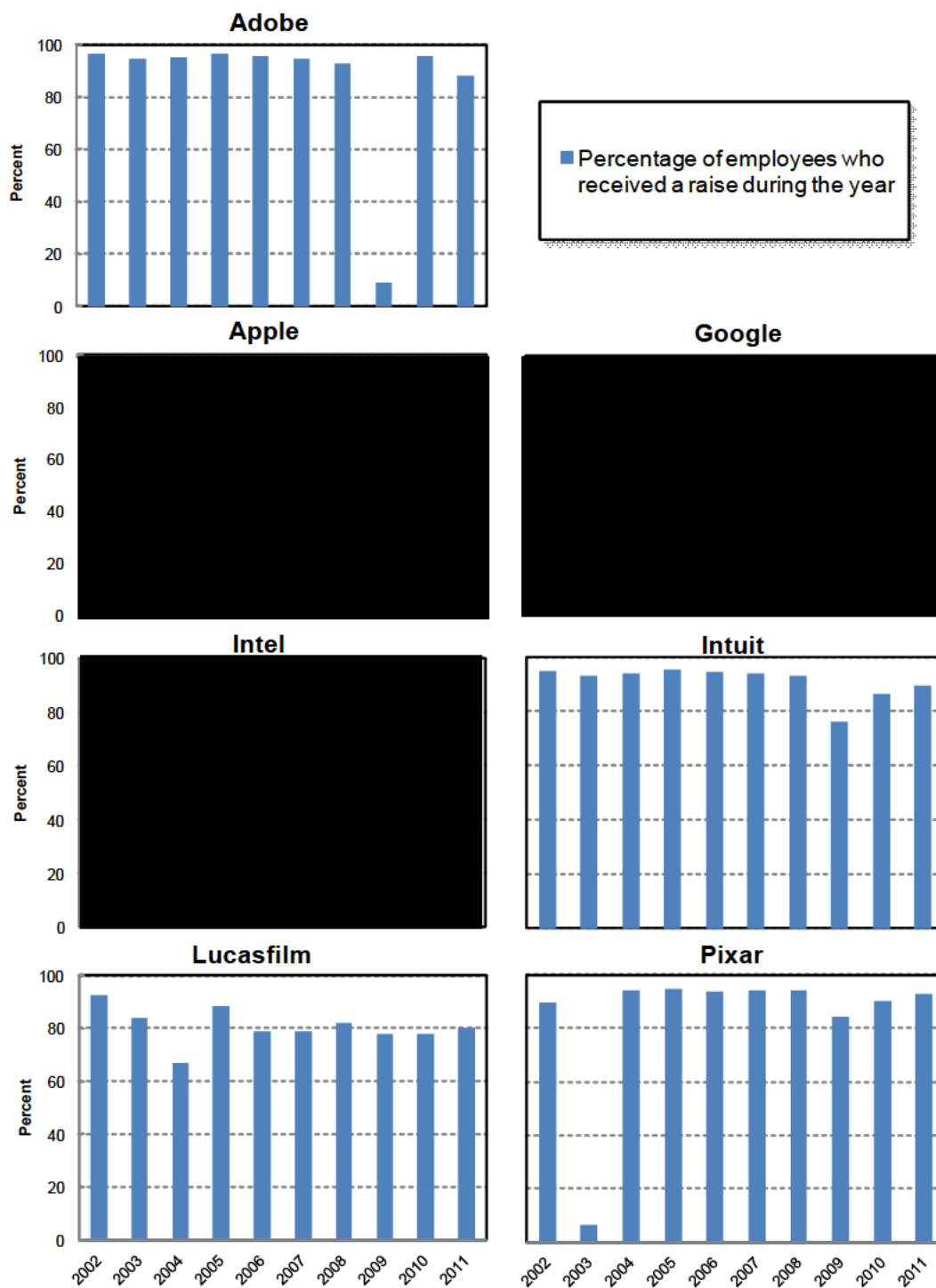
D. **Dr. Murphy is Incorrect that the Defendants' Data Do Not Indicate that Fairness and Internal Equity Matter**

57.   Dr. Murphy's fourth opinion is that "Defendants' compensation structures are not rigid," but he supports this opinion by attacking only the conclusions I made from my analysis of Defendants' data, leaving intact the important economic theory and decisive HR documents. Here is what Dr. Murphy has argued:[75]

> (a) Defendants had (and exercised) substantial flexibility in setting compensation of individual employees. Dr. Leamer's own model implies that employee compensation was highly individualized, with large variations even within particular job categories and between observationally similar individuals (see Part IV.D, below). As I demonstrate below, in every year and for each Defendant, there is substantial dispersion in employee compensation unexplained by Dr. Leamer's model. Dr. Leamer has shown that different jobs have different average compensation, but not that increases in an individual's compensation resulting from a cold call results in higher compensation for other employees.

> (b) Dr. Leamer's premise is also flawed. A rigid wage structure, even if one existed, would not imply that a change in compensation for one or more employees would shift the entire structure, because the cost of increasing compensation for one employee would be enormous (an increase for all employees), and would be resisted. Thus, Dr. Leamer's theory makes no economic sense.

> (c) Finally, Dr. Leamer's analysis cannot distinguish the impact he hypothesizes from an alternative hypothesis that compensation of Defendants' employees is broadly determined by competition in a vast labor market, and that adjustments for individual employee's unique circumstances (such as an attractive outside offer) are highly individualized (see Part V.D.3, below).

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[75] Murphy Report, pp. 10-11.

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58.   The issue here is not some technical characterization of what is rigid and what is
        not. The issue is whether internal equity concerns spread the anti-cold-calling
        effects on compensation broadly across all or most members of the classes. I wrote,
        "A firm's commitment to principles of 'internal equity' is evidenced by the
        imposition and maintenance of a somewhat rigid salary structure."[76] Dr. Murphy
        attacks the regression equations that I used to describe the internal salary structure
        but ignores the real question: do these firms spread the compensation suppressing
        effects of the agreements broadly because of internal equity considerations?

59.   The information revealed from my analysis of Defendants' employment records
        adds to this body of evidence. However, my opinions regarding common impact do
        not rest wholly or even mostly upon that analysis.

60.   I do not (and did not) suggest that the "Hedonic" regressions I reported were
        conclusive proof that internal equity influenced compensation. They serve a
        different purpose. Defendant documents reveal a top-down salary-setting
        mechanism with overall increases in compensation determined by the top
        management leaving limited salary setting discretion at lower levels of
        management.[77] Market driven compensation setting would be bottom-up with each
        employee receiving compensation commensurate with their outside opportunities.
        A bottom-up market-driven approach ignores internal equity completely. A top-
        down approach allows internal equity to play a role in the determination of
        compensation. The hedonic regressions are a numerical representation of the top-
        down compensation setting which allows but does not necessitate internal equity to
        play a role in salary setting.

61.   In various instances (Dr. Murphy's Report, Declarations, questions during my
        deposition), the Defendants have focused on the variability in the compensation
        received by Class Members.[78] This discussion misses the mark. Even in firms with
        a "somewhat" rigid salary structure, it is to be expected that there will be salary
        variations for people sharing a title. This is not a symptom of firms setting

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[76] Leamer Report, p.49.

[77] Leamer Report, ¶ 121.

[78] Defendants Opposition to Class Certification, November 12, 2012, pp. 7-8.

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compensation randomly but almost certainly reflects differences in the people and jobs that are <u>part</u> of the compensation structure. In any regression analysis that seeks to explain employee compensation, if sufficient data are available regarding these employee and job characteristics, much of the dispersion would be explained, and the unexplained dispersion (the residuals) would be small. However if sufficiently detailed data are not available (such as is the case here) these residuals will not necessarily be small.

62.   Defendants' anecdotal examples purport to show that similar Class Members have very disparate and unexplainable differences in compensation. However, even here the effects of Defendants' compensation structures are apparent. For example, Defendants say ███████████████████████████████████████ ██████ [79] But Defendants fail to note that ████████████████████████ ██ ███████████████████████████████████

63.   For example, ██████████████████████████████████ ██ ██ ██ ██████████████████████████████ .

64.   Defendants also attach an example of Apple's "██████████████████ ███ ."[80] Again, common objective factors, such as title, confirm a lack of variation among similar employees. Thus, ███████████████████████████████████████ ██ ██████████████████████████████████████

65.   Figure 2 shows that for every firm in every year the prediction error of the common factors regression is typically small (about 10 percent of total compensation and often less). Figure 3 shows that there is strong overall relationship between Class Members' actual total compensation and the total compensation predicted by the

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[79] Declaration of Danny McKell, November 12, 2012 at ¶ 10.

[80] Declaration of Steven Burmeister, November 12, 2012, Ex. B.

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common factors regression, with these two figures generally having very high
positive correlations.

Figure 2: Common Factors Explain Most of Class Members' Compensation Variation

Source: Defendants' employee compensation data; Analysis of Leamer Report Figure 12.

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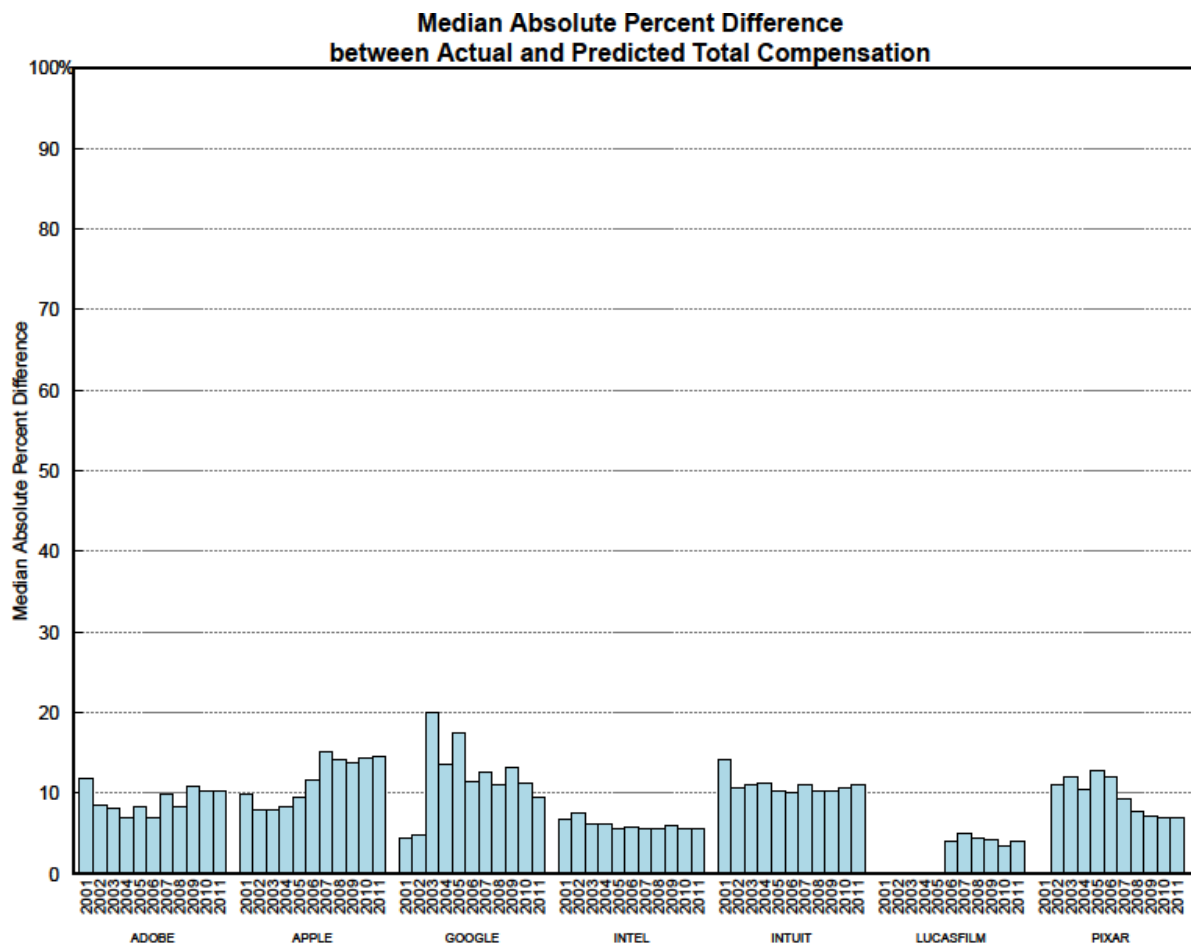
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Figure 3: Hedonic Model's Predictions Generally Are Highly Correlated with Actual Compensation
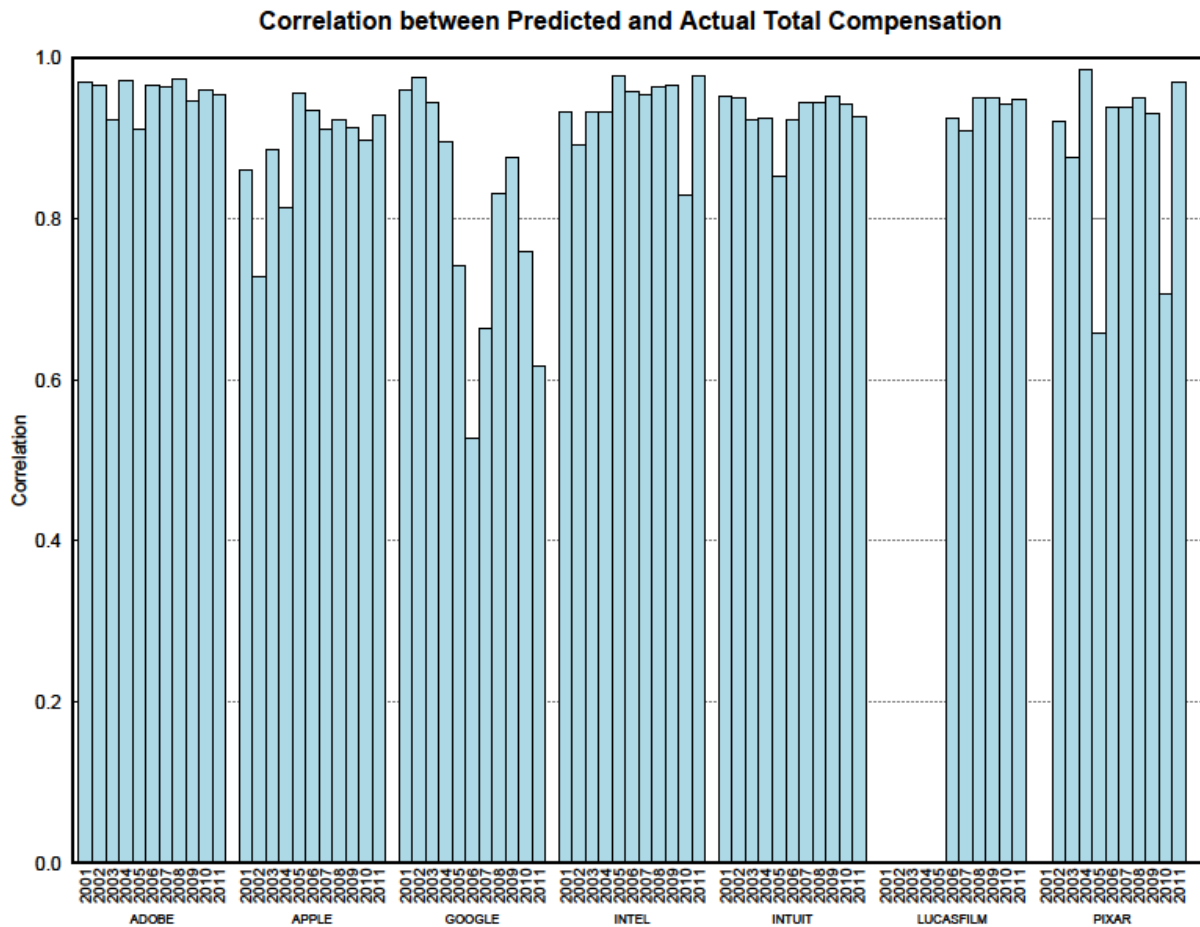
Source: Defendants' employee compensation data; Analysis of Leamer Report Figure 12.

66.   Though these firms may have provided certain managers limited and closely supervised discretion over setting compensation levels, that discretion can be exercised (and if not, corrected) in favor of internal equity (and given the documents and other evidence here, very likely was). Discretion is not synonymous with market-driven.

E.   **Dr. Murphy is Incorrect that My Hedonic Analysis of Named Plaintiffs' Compensation Performed Poorly**

67.   Although Dr. Murphy attempts to use the Named Plaintiffs to show that my hedonic model of compensation performs poorly, actually the opposite is the case. Figure 4 below shows a scatter of predicted versus actual total compensation of the Named Plaintiffs computed by Dr. Murphy. The hedonic model performs well in predicting

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the actual compensation of these individuals, especially considering the fact that - as mentioned above—the model was only a partial representation of their salary within each firm's structure. The overall correlation between the Named Plaintiffs' actual total compensation and total compensation predicted by the hedonic model is 0.75. To the extent these individuals might indicate room for improvement in that model, it is with respect to the effect of changes in employment. The larger differences in predicted versus actual are for observations where an employee started a job or had a promotion (particularly Mr. Stover in 2008). Excluding those observations the correlation is 0.94. This model could potentially be improved— particularly if there were additional information for all the employees in the data such as their education, skills, and performance. Those data would assist in filling out the picture on the Defendants' compensation structure.

68.   In addition, Dr. Murphy's assessment that the hedonic regressions show "overcompensation" for these individuals[81] is a gross misapplication of these equations, which were not designed to determine who was under-compensated and who was over-compensated, or by how much. These regressions serve only to demonstrate the salary structures that each Defendant used to determine compensation. However, the CONDUCT regressions in my Report were designed to determine the amount of over- or under-compensation by each Defendant consequent to the agreements.[82] Those CONDUCT regressions show only under-compensation during the conspiracy period.

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[81] Murphy Report, ¶ 93.

[82] Leamer Report, Figure 20-24.

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Figure 4: Actual vs. Predicted Total Compensation for Named Plaintiffs
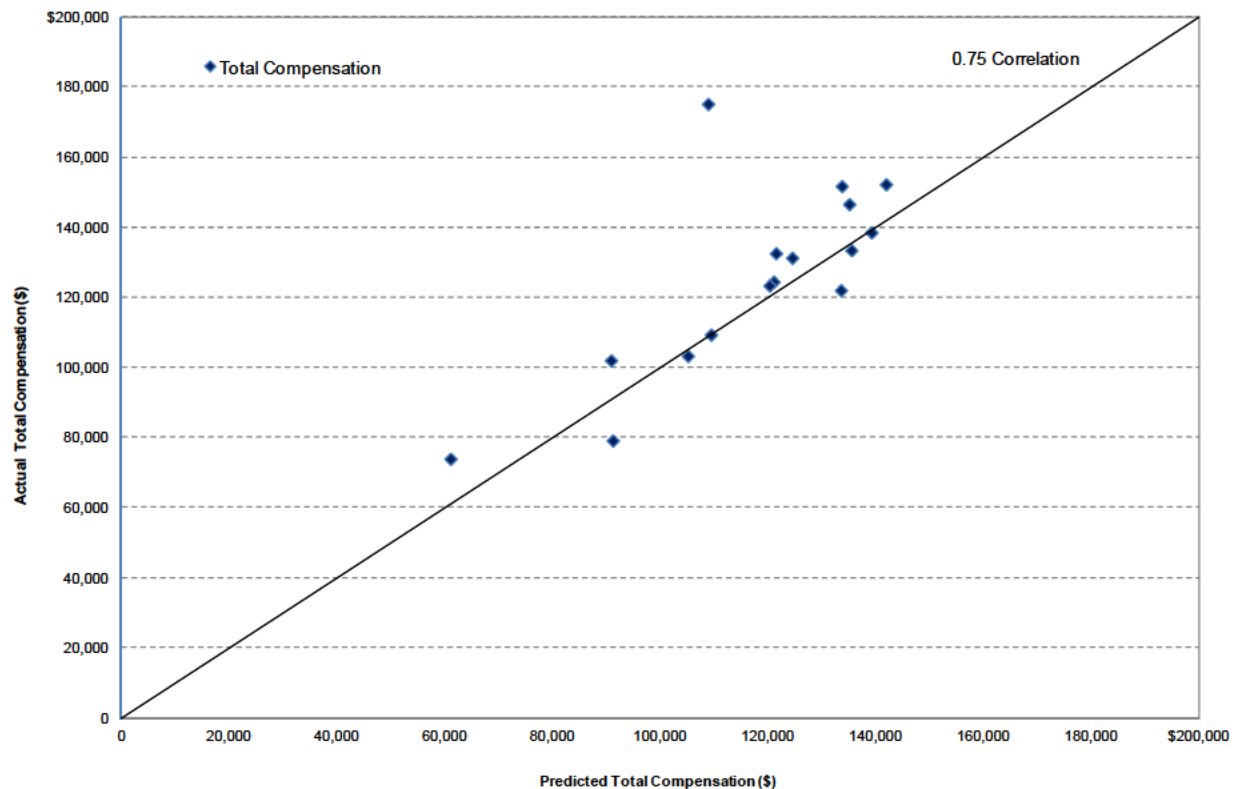
Source: Defendants' employee compensation data; Analysis of Leamer Report Figure 12.

IV.   My Conduct Regressions Are Reliable Class-Wide Evidence That the Agreements Suppressed Compensation on a Widespread Basis

69.   Dr. Murphy's final opinion is that my "conduct regressions suffer from severe conceptual and methodological flaws and are completely unreliable and thus uninformative. His regression methodology provides evidence that is inconsistent with his conclusion of class-wide impact and damages."[83]

70.   Dr. Murphy has raised a number of issues about the "CONDUCT" regression that I used to demonstrate that there is "a reliable Class-wide or formulaic method capable of quantifying the amount of suppressed compensation suffered by each

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[83] Murphy Report, p. 11.

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class." First, my reactions to Dr. Murphy's comments need to be put into the proper context.

71.   This allegedly illegal conduct did not target any single individual. This was an attack on the information network that keeps employees informed of opportunities elsewhere. Thus, in this case, damages are not determined at the individual level. Damages are a consequence of being a part of the information network under attack. Additional damages flow from the forces of internal equity that spread the harm across all or most members of these firms. These additional damages are completely a consequence of being a member of this group.

72.   I have thus used a regression model to demonstrate "a reliable Class-wide or formulaic method capable of quantifying the amount of suppressed compensation suffered by each class." This regression model is a widely accepted way of determining whether and by how much an act or a set of acts affected price or compensation. It does so by contrasting statistically the periods in which illegal behavior was occurring with the periods in which it was absent. The model quantifies the harm to the class and in doing so tells us something about the existence of that harm and its widespread nature.

73.   Tellingly, rather than casting aside this approach in favor of something else, Dr. Murphy has conducted variations of my proposed model with the same approach in mind. For example, by estimating the "conduct regression" using only the pre- or post-agreement periods Dr. Murphy has attempted to evaluate the effect on class member compensation by contrasting compensation of individuals during the agreement period with compensation during periods absent of the agreements.[84] Another example is Dr. Murphy's "conduct regression" that uses the non-conduct period in attempt to model the compensation absent the agreements, and then estimates the but-for salaries during the period of agreements.[85] With this model, Dr. Murphy again has made an attempt to assess class-wide impact of the agreements.

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[84] Murphy Report, Appendix 12A-12D.

[85] Murphy Report, Appendix 13A-13B.

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74.   Although he takes the same approach that I have used, and apparently accepts it as a
        valid way to proceed, Dr. Murphy has made critical errors in implementation of the
        approach which led to him to a wrongful conclusion that the model shows no under-
        compensation to the classes. I describe this in detail below.

75.   A critical step in using the regression tool is to decide what control variables need
        to be included in the equation. In my report, I have tried to suggest the seriousness
        with which I approached this task partly by listing the categories of variables that
        need to be included and by making sure that my regression includes variables from
        each category: Conduct Effects, Persistence, Worker Effects, Industry Effects, and
        Employer Effects. I have included variables that reflect each and every one of these
        categories. My opinion is that the list of categories is complete and reliable as it
        currently stands, though the choice of variables within each category is open to
        further refinement (as it almost always is with non-experimental data).

    A. **Calculation of Standard Errors Assumes Statistical Independence**

76.   Dr. Murphy has raised an issue of dependence among the observations and has
        suggested the treatment of the problem is to correct upward the standard errors of
        the coefficients. While Dr. Murphy has here identified an issue, he does not
        propose an appropriate solution. One response would be to include a variable or
        variables in the equation that account(s) for the correlation, leaving the residuals
        adequately independent. The many variables that I have included to some extent
        already accomplish this task.

77.   Incidentally, and importantly, there is nothing in my report that refers directly or
        indirectly to the standard errors that Dr. Murphy is complaining about. This is
        because I did not rely on them and my conclusions do not depend on them.

78.   The regression I estimated makes use of data on nearly 98,888 individuals and
        assumes that the variables in the regression account for all of the similarities among
        the individuals, and what is left over is uncorrelated "noise." If what is left over is
        correlated among individuals in a known way, then one treatment is to adjust both
        the regression coefficients and the standard errors. I have written the words "one
        treatment" so as not to lose track that the better treatment is to find a variable or
        variables that are causing the correlated error structure.

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79.   If the correlations among individual observations are mostly positive as Dr. Murphy
        suggests, then the standard errors would be adjusted upward, though it is impossible
        to tell what would happen to the estimated coefficients, and the statistical
        significance of selected variables can go up or down.

80.   Unfortunately, it is impossible for anyone to know what is the covariance matrix
        that is needed to revise the estimates of my model. In addition, we cannot use these
        data to estimate the covariance matrix. The huge covariance matrix that describes
        the covariance of all pairs of individuals has 98,888x98,887/2 = 4,889,368,828
        elements to be estimated from only ten annual observations at most on each
        individual. That's impossible. Instead, the right variables must be chosen to
        describe how the covariances change across individuals.

        **1. *Dr. Murphy Relies on a "Somewhat" Rigid Wage Structure in his Adjustment
              of the Standard Errors.***

81.   If this issue is transformed from theory into practice there has to be some structure
        imposed on the huge number of new parameters introduced by the vague idea of
        correlation among the residuals. We need a careful analysis to decide on that
        structure. To do this, Dr. Murphy relies on his observation that there are somewhat
        rigid salary structures at Defendant firms. This is a rather important concession,
        contradicting his claims elsewhere that salary structures are not rigid. Here, Dr.
        Murphy *criticizes me* for failing to recognize how common elements determine
        compensation of all individuals at all Defendant firms. As Murphy puts it: "**He
        [Leamer] failed to take into account when performing his statistical test that,
        aside from the challenged agreements, employees at a firm are affected by
        common factors that influence their compensation – e.g., a highly successful
        movie at Pixar can result in large and unusual bonuses for all Pixar employees,
        or a short-term reduction in the demand for PCs and the microprocessors that
        power them can cause a decline in Intel's revenue and profitability and lead
        Intel to impose a wage freeze such as occurred in 2009**."[86]

82.   In addition to this rejection of his own opinion, this explanation by Dr. Murphy
        ignores the fact that revenues of both Intel and Pixar are included in my model, and
        to the extent that movements in revenue account for common within-firm

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[86] Murphy Report, ¶ 124 (emphasis added).

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movements, then that is fully taken into account in my regression, and does not
need treatment of the type that Dr. Murphy is recommending. As an aside, Dr.
Murphy's emphasis of these facts shows that he well understands the importance of
internal equity to the pay structures of the Defendants; the events he describes
cannot be reconciled with the "classical" model of economics he elsewhere
advocates where workers contract and re-contract at the whim of supply and
demand.

2. *The Best Solution is to Include Variables that Eliminate the Correlation Problem*

83.   This connects to the most important point. If we can measure items like revenues
that create important commonalities across individuals, we should generally include
those variables in the equation and suitably adjust the coefficients on all the
variables as well as the standard errors. In the process we would remove the
observable commonalities from the residuals, perhaps making the unexplained part
of the model sufficiently uncorrelated across individuals that the independence
assumption of the regression technique is adequately satisfied. In other words, it
would be a mistake merely to adjust the standard errors—as Dr. Murphy suggests—
if the estimated coefficients would be substantially affected by the same issue.
Thus I included revenue variables in my model.

3. *Dr. Murphy's Employer-Year Fixed Effects Proves too much as it would Invalidate Any Before-During-and-After Model*

84.   Dr. Murphy has hypothesized that revenue increases at Intel and Pixar may cause
correlated increases in compensation at these two firms. But since my model
already includes revenues, Dr. Murphy's follow-on to his criticism about the
standard errors in my model does not refer to revenues even though that was the
only reason cited for going down this path. Instead he opts for "employer-year"
effects, which are the basis for his adjusted standard errors. There are two basic
problems with these employer-year effects. First, these variables collectively stand
for some unnamed variable like firm revenue that explains why the residuals are
correlated. That variable should be named and utilized. Second, these variables
together seriously overload the model and make it impossible to estimate the
CONDUCT effect if all these variables were added to the model. Dr. Murphy has
not included the employer/year effects in the regression, but conceptually he has

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edged significantly in that direction when he adjusts the standard errors for clustering based on years. The much better route is to find why the model does not track the employer-year averages well enough to render this issue moot. This just requires another well-chosen explanatory variable.

    B. **Dr. Murphy's "Sensitivity Analysis" is Flawed**

85. Dr. Murphy purports to have performed a "sensitivity analysis" of the conduct regression but in reality he has done no such thing. His "analyses" consist of (a) clustering the standard errors, (b) adding the S&P 500 as a variable, and (c) "disaggregating" the model.

86. The large and statistically significant firm-year effects in the regression serve as Murphy's basis both for his clustered standard errors and for including the S&P Stock Price in the equation.

> "The test resoundingly rejects the hypothesis that there are no such omitted firm-specific factors, and establishes the need to use 'clustered' standard errors (or correct for that correlation in other ways)."[87]

> "A consequence of omitting important determinants of firm-level compensation is that Dr. Leamer's estimated conduct effects will capture the impact of variables (other than the challenged agreements) that differ systematically between the conduct and non-conduct periods. To illustrate the potential problem, I considered what would happen if I simply add a variable measuring the performance of the stock market from his regression, which potentially would measure general economic and financial performance in the economy that Dr. Leamer acknowledges likely affect compensation (see his Figure 8 and related discussion).[183] Exhibit 26 shows the results from adding the change in the

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[87] Murphy Report, ¶ 137.

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> S&P 500 index as an explanatory variable in his conduct
> regression."[88]

87.   While it is wise to be looking for variables to include in the model rather than just playing technical games with the standard errors, it is a major mistake to include the S&P index. As Dr. Murphy noted in his deposition, there are literally thousands of macroeconomic variables that might be included.[89] Some of these variables are sure to destroy the damage estimate. Locating such a destructive variable is not a success. There has to be some wisdom in the selection of variables to be included.

88.   Why would the stock market variable be included at all? My model includes employment in the information sector to capture the overall business cycle effects and also includes firm revenues to capture the cycles afflicting each of the seven Defendants. Dr. Murphy has not provided a persuasive reason that that the S&P 500 index captures cycle issues not already captured by these variables.

89.   A stock market index reflects the expected future revenue of the firms that comprise the index. Included among the 500 firms in the S&P index are many firms (e.g., Goldman Sachs) that have no bearing on the Defendant's compensation. Adobe and Apple do not decide to increase their compensation when the prospects of future revenue at Goldman Sachs improve. It might be more sensible to use the stock market values of the firms themselves (see below) but the revenue variables in my model should capture most of the information in these stock market valuations.

90.   Worse yet, Dr. Murphy has used the end-of-year value of the S&P Net Total Revenue Index. If Dr. Murphy's intent was to control for the effect of "general economic and financial performance in the economy"[90] on compensation, then his variable must adequately capture this effect and align the timing of the effect with the timing of the dependent variable—in this case total annual compensation, which is not determined until the last minute of the last trading day of the year—since there are stock options, restricted grants and bonuses that accrue throughout the

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[88] Murphy Report, ¶ 138.

[89] Murphy Deposition at 302:18-304:1:4.

[90] Murphy Report, ¶ 138.

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year. This is a flawed variable which is not a logical candidate for inclusion in the model.

Figure 5: December 31 Was Not a Key Date for Employee Compensation

Timing of Substantial Adobe Base Salary Adjustments and Equity Compensation Payouts

Date	Percent of Workforce Receiving Base Salary Adjustment (Percent) (1)	Date	Percent of Workforce Receiving Equity Compensation Payout (Percent) (2)
Jun-01	95 %	Mar-01	92 %
Jul-02	95	Nov-01	33
Jul-03	94	Nov-02	22
Jun-04	94	Dec-03	47
Jun-05	95	May-04	43
Jun-06	96	May-05	95
Mar-07	95	Jun-06	65
Mar-08	96	Jan-07	67
Mar-10	93	Jan-08	68
Mar-11	91	Jan-09	51
		Jan-10	49
		Jan-11	57

Notes: The above lists all the months in which 10 % or more of the workforce received a base salary adjustment or equity compensation payout from 2001-2011. Values are rounded to nearest percentage.

Source: Defendants' employee compensation data.

91.   One critical problem is that the value of the S&P Index on any particular day does not capture any fluctuations that occurred during the year. If, for example, the S&P were either to rise or fall substantially the last days of December, that movement cannot possibly have had an effect on all the compensation decisions during the preceding year. The total compensation figure that is being explained here reflects base salary as of December and all the bonus and stock payments accumulated over the preceding year. Defendants, like many employers, adjust the salaries and hand out supplemental compensation with a "schedule" that occurs in different points throughout the year. Figure 5 shows the months in each year when large fractions of

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Adobe's employees received their base salary adjustments or equity compensation. There were only two instances where compensation adjustments for the largest group of employees were made in December. For example, Adobe adjusted most of its employees' salaries in March, June, and July depending on the year. Adobe's stock grants were largely paid out in January, May, and November. Figure 6 and Figure 7, below, show that these dates varied across Defendants and across years, but were often earlier in the year. Thus, Dr. Murphy tries to explain an employee's compensation at a point in time with the *future level* (unknown at the time) of the stock market.

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Figure 6: Frequency of Calendar Months for Base Compensation Increases
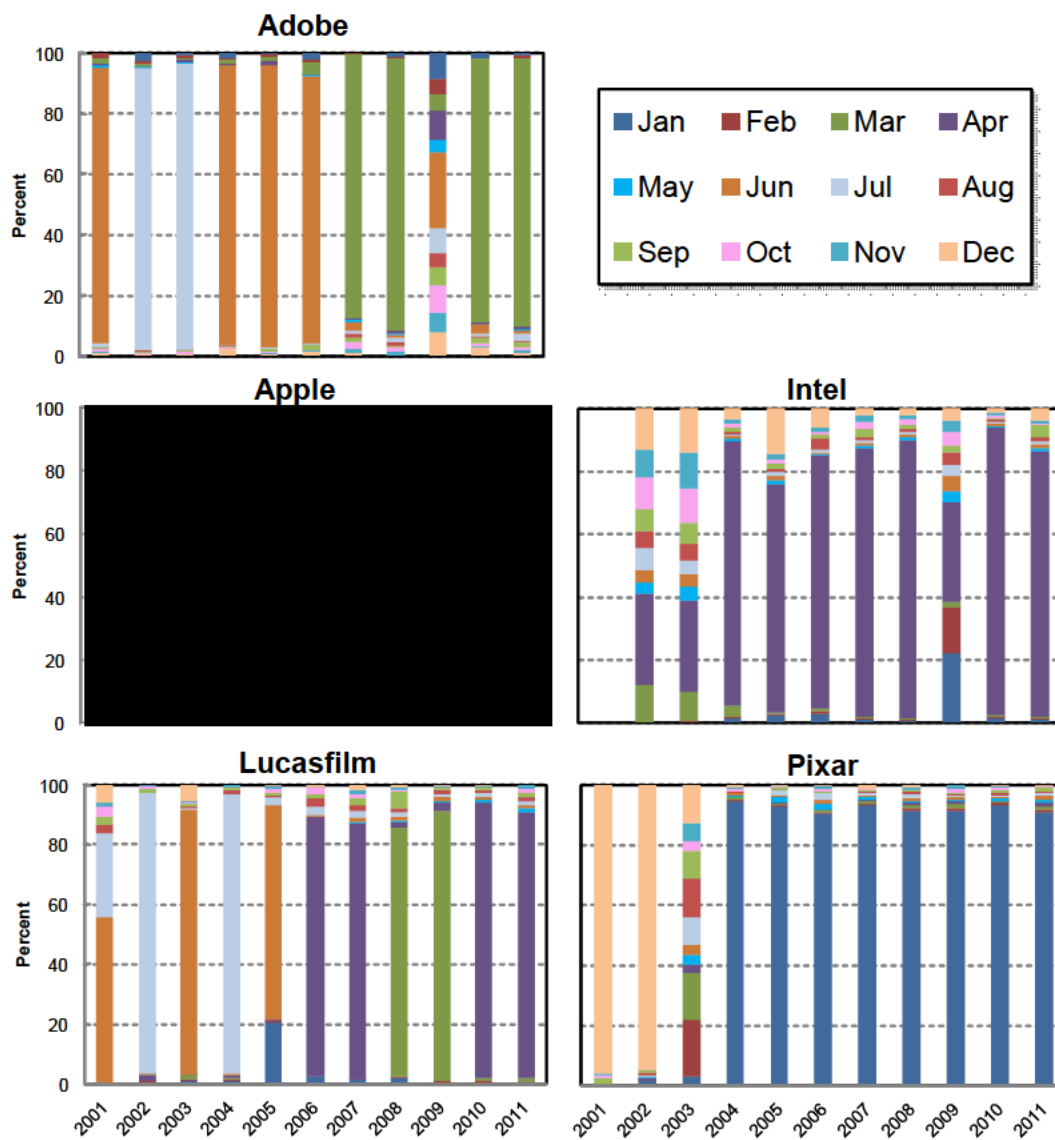
Note: Google and Intuit did not provide sufficient data and information regarding their policy and timing on raises.
Source: Defendants' employee compensation data.

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Figure 7: Frequency of Calendar Months for Equity Distributions
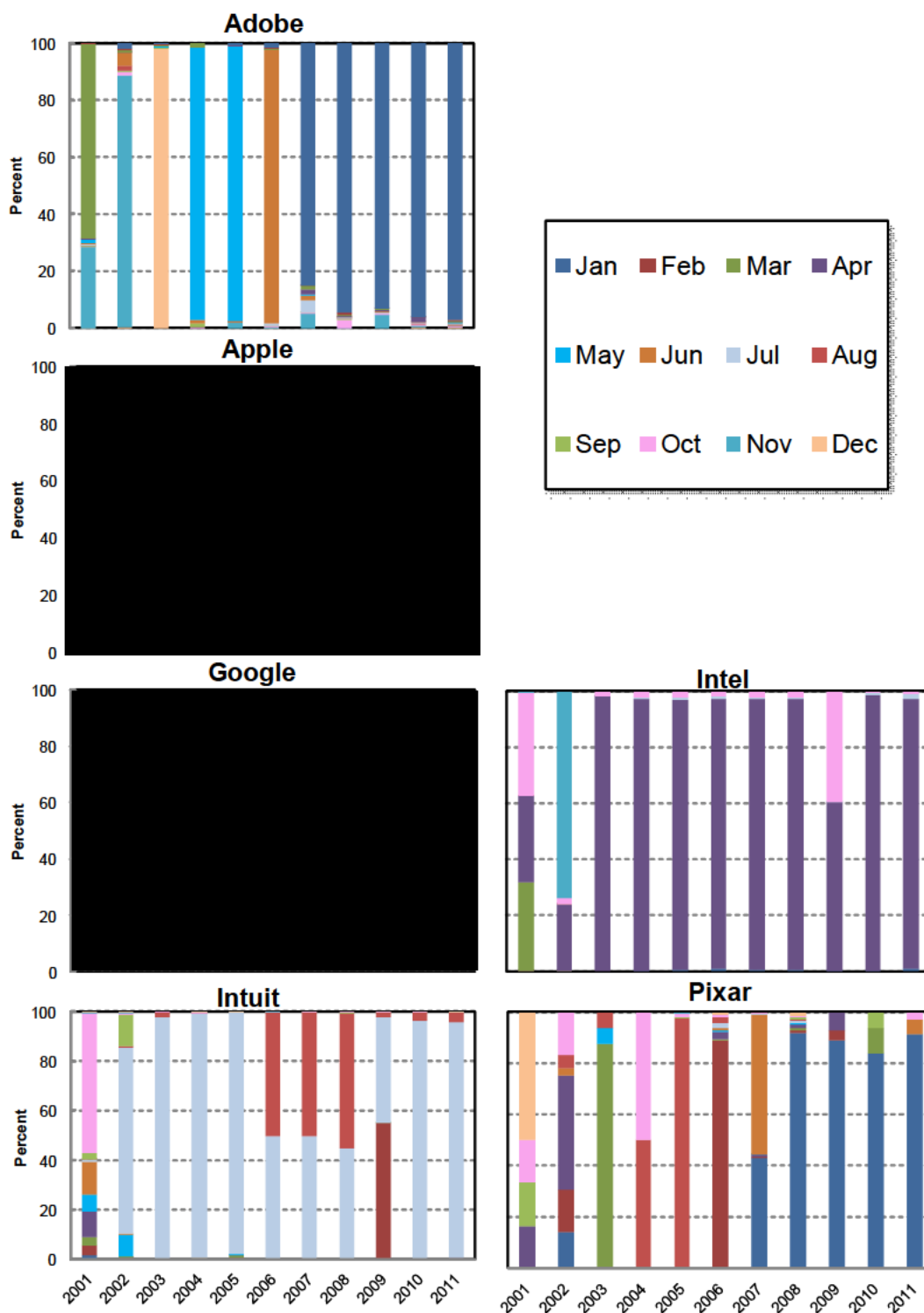
Note: Lucasfilm is not a publicly traded company prior to its acquisition by Disney in 2012.
Source: Defendants' employee compensation data.

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92.   In Figure 8 and Figure 9 below I show the results of a corrected version of Dr.
        Murphy's sensitivity analysis with the growth of annual average value of S&P 500
        Index in place of the end-of-year values. Contra Dr. Murphy, the original results
        are not sensitive to this change. Dr. Murphy's finding that the S&P end-of-year
        appreciation changes my result is a great example of how sensitivity analysis can go
        wrong.

Figure 8: Murphy Damages Model with the Average S&P 500 Index (All)

Annual Undercompensation Percentages
All-Salaried Employee Class

	ADOBE	APPLE	GOOGLE	INTEL	INTUIT	LUCASFILM	PIXAR
2005	-1.13%	-1.13%	-1.31%	-1.19%		-8.58%	-7.36%
2006	-3.02%	-3.15%	-3.27%	-3.37%		-10.34%	-8.56%
2007	-4.69%	-4.94%	-4.68%	-5.36%	-2.30%	-12.17%	-9.73%
2008	-6.43%	-6.79%	-6.13%	-7.23%	-4.00%	-14.05%	-10.62%
2009	-6.49%	-6.90%	-5.48%	-7.17%	-4.03%	-14.16%	-9.66%

Source: Regression Estimates of Undercompensation to All-Salaried Employee Class.

Figure 9: Murphy Damages Model with the Average S&P 500 Index (R&D)

Annual Undercompensation Percentages
Technical Employee Class

	ADOBE	APPLE	GOOGLE	INTEL	INTUIT	LUCASFILM	PIXAR
2005	-1.62%	-1.93%	-2.97%	-1.69%		-10.96%	-9.66%
2006	-4.44%	-5.05%	-7.02%	-3.31%		-14.83%	-10.99%
2007	-6.73%	-7.91%	-9.13%	-3.86%	-3.50%	-18.08%	-11.34%
2008	-9.15%	-10.80%	-10.97%	-5.41%	-5.37%	-20.46%	-12.67%
2009	-8.82%	-10.66%	-8.83%	-4.85%	-5.12%	-20.50%	-10.52%

Source: Regression Estimates of Undercompensation to Technical Employee Class.

93.   In addition, I have estimated the conduct regression models incorporating *each
        firm's* annual average stock price values. This variable has a much greater ability to
        capture any remaining but pertinent effect of "general economic and financial
        performance" potentially not captured by the revenue variables. Figure 10 and

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Figure 11 below show the undercompensation percentages derived from this regression.

Figure 10: Murphy Damages Model with Defendants' Stock Prices (All)

Annual Undercompensation Percentages
All-Salaried Employee Class

	ADOBE	APPLE	GOOGLE	INTEL	INTUIT
2005	-2.73%	-2.66%	-2.62%	-2.78%	
2006	-7.24%	-7.41%	-6.59%	-7.92%	
2007	-11.21%	-11.62%	-9.66%	-12.65%	-5.44%
2008	-15.33%	-15.97%	-12.79%	-17.06%	-9.47%
2009	-15.40%	-16.27%	-11.45%	-16.94%	-9.59%

Source: Regression Estimates of Undercompensation to All-Salaried Employee Class.

Figure 11: Murphy Damages Model with Defendants' Stock Prices (R&D)

Annual Undercompensation Percentages
Technical Employee Class

	ADOBE	APPLE	GOOGLE	INTEL	INTUIT
2005	-2.83%	-3.04%	-3.77%	-2.89%	
2006	-7.55%	-8.16%	-9.04%	-6.93%	
2007	-11.50%	-12.72%	-12.25%	-9.83%	-5.83%
2008	-15.65%	-17.34%	-15.22%	-13.37%	-9.39%
2009	-15.26%	-17.22%	-12.55%	-12.75%	-9.19%

Source: Regression Estimates of Undercompensation to Technical Employee Class.

1. *Dr. Murphy's Study of Data Subsets Typifies What Happens When a Model is Overloaded*

94.   A misleading, but unfortunately common, tactic when attacking a regression model is to overload the model with so many variables that it produces wild and statistically insignificant results. This is exactly what Dr. Murphy has done in several different ways.

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95.   Dr. Murphy has modified my proposed model of class-wide damages to test for
        sensitivity to benchmark periods. First, he estimates the conduct regression using
        only the pre-period as the benchmark. Then he estimates the conduct regression
        using only the post-period as the benchmark.[91]

96.   In order for a regression model to have any ability to estimate an effect on
        compensation, the model has to utilize an adequately informative benchmark
        period. By modifying the regression model to include only pre-conduct (or post-
        conduct) period as a benchmark, Dr. Murphy is trying to estimate the effect of the
        conduct that occurred over five years by utilizing the experience of merely two non-
        conspiracy years. It is startling that Dr. Murphy would conduct such an exercise in
        light of his understanding that the information in the data is limited.[92]

97.   Another "sensitivity" test he conducts is to "first estimate [the] conduct regression
        using data outside [the] conduct periods, and then use the coefficient estimates to
        predict compensation during the conduct period."[93] Again, Dr. Murphy puts an
        enormous burden on a regression model to explain compensation using two
        disjointed two-year periods. It is important to note that the regression model is
        dynamic, i.e. incorporates the evolution of both total compensation and
        macroeconomic factors in explaining compensation levels. Thus, to throw away
        data in the middle of the time-period in hand (that also covers half of the entire
        time-period) is not sensible and may lead to an inaccurate and misleading result.

        ### 2. *Dr. Murphy's Partial Disaggregation by Defendant is Improperly Implemented in a Manner Designed to Make the CONDUCT Variable Perform Poorly*

98.   Any econometric analysis rests on wisely chosen assumptions about similarities
        among the observations. A standard similarity assumption is that an individual's
        responses to opportunities and stimuli are similar over time, and to the extent that
        there are dissimilarities these are captured by control variables that change over

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[91] Murphy Report, ¶ 133.

[92] "...[the dataset] effectively [has] fewer than 60 observations from which to estimate [the]
conduct variable" (*parentheses omitted)*. Murphy Report, ¶ 123.

[93] Murphy Report, ¶ 134.

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time such as age. A similarity assumption is what allows one to use observations of a single individual at different points in time to estimate a model. Without that similarity assumption, estimation of the model cannot proceed. The assumption of similarity of individuals over time is entirely standard. It is also an entirely standard assumption that two individuals in the same firm are similar, and two individuals in different firms are also similar, in the sense that their dissimilarities can be adequately controlled for in the model. This is what allows the estimation of a model based on individual data taken from the same firm and from different firms.

99.   Depending on the context, the right place to position a data analysis is somewhere between the extremes of perfect similarity and perfect dissimilarity. But if the data set is large and informative enough, it does little damage to allow perfect dissimilarity in the model, and then let the data decide how much dissimilarity actually applies. However, the weaker and/or briefer is the data set the more reliant we are on making the right similarity assumption. This data set we are studying is too limited to throw away the similarity-across-firms assumption as Dr. Murphy proposes.

100.   Dr. Murphy, in his critique regarding the correlation across individuals, says that the dataset in reality is not as large as it seems. "Dr. Leamer's sample contains over 500,000 individual observations, but fewer than 60 unique combinations of employer and year (and thus effectively fewer than 60 observations from which to estimate his conduct variable)."[94] This should have been an alert to Dr. Murphy that one can only go so far in including variables that could reliably identify the conduct effect. By incorporating an additional 42 conduct interaction variables, Dr. Murphy has overwhelmed the model, making the conduct effect virtually unidentifiable.[95]

101.   Complete disaggregation would require an entirely distinct model for each Defendant. Per Dr. Murphy's thinking about the effective number of observations, this would reduce the number to at most 11 annual observations for each Defendant, and it would be impossible to estimate a model of the scope of mine with so few time-series experiments. Dr. Murphy has not gone that far. What he has done is to disaggregate each and every variable in my model that is directly related to the

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[94] Murphy Report, ¶ 123.

[95] Murphy Report, Appendix 9A-9B.

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CONDUCT effect, but he has left *all* other variables free of the Defendant effect. This seems designed only to minimize artificially the CONDUCT variable, not to approach sensibly the disaggregation issue.

102.   In my model I allow some amount of variability in the CONDUCT effect across Defendants depending on their rates of hiring. In my model, I have allowed for the lagged dependent variables to vary by Defendant because it became apparent that the time series patterns were different, especially for the Google data. If I were going to disaggregate one more effect it would be revenue, based on the idea that these seven firms might have had different approaches to sharing their revenue gains with their employees. In other words, disaggregation requires better judgment than just throwing an excessive set of additional variables into the model, as Dr. Murphy has done.

3. *Firm-Wide Data Can Correct for the Correlation Problem*

103.   As Dr. Murphy points out, the issue with correlation across individuals can be solved in different ways.[96] One of Dr. Murphy's sources identifies "use group averages instead of microdata" as one of three solutions to correlated observations.[97] The perils of disaggregation with this dataset can be clearly seen if one estimates the model with an annual averaged dataset by employer-year.

104.   With these firm-level annual aggregates, as Dr. Murphy points out (if we reject his earlier opinion regarding the absence of Defendants' compensation structures), there are only have 60 observations to work with. With only nine or fewer observations per Defendant it is impossible to estimate a separate equation for each Defendant. Expressed differently, with a fully disaggregated model the standard errors of the coefficients are very large–infinite in fact. Inevitably, as we move in the direction of full disaggregation, the standard errors are going to get larger and larger. We thus need some wisdom to decide how much disaggregation is best.

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[96] "[The test] establishes the need to use 'clustered' standard errors (or correct for the correlation in other ways.)" Murphy Report, ¶137.

[97] Angrist, J. D. and J. Pischke, Mostly Harmless Econometrics, New Jersey: Princeton University Press, 2009, Chapter 8.2, pp. 312-313.

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105.   Though the information in the employer-year data is limited, we can still extract
        some useful information from it.

106.   The challenge with estimating a model with few observations and many potential
        variables is to choose wisely the similarity assumption. Using the employer-year
        data we can allow the conduct effect to vary freely for each Defendant as proposed
        by Dr. Murphy. We can also incorporate the firms' stock prices to fully account for
        "general economic and financial performance," of which Dr. Murphy expressed
        concern. However, with so few observations we have to make a judgment about
        how many other variables we want to include. I have decided to limit the
        persistence variables to one-lag, common across defendants, and to exclude the
        trend variable, both for the same reason–this is a too short a times series to pick up
        these effects.   Figure 12 and Figure 14 show the corresponding conduct regression
        model which uses annual average data at company-year levels instead of individual
        employee observations. Here, a single conduct variable is interacted with each
        employer, meaning that the effect of the agreement is allowed to be completely
        distinct for each Defendant. In addition, I include the lag of annual average stock
        prices of the companies, similar to Dr. Murphy's use of the S&P 500 index.

107.   With a small sample size (30 degrees of freedom) the burden is too high to allow
        statistical significance of the collection of all variables at conventional 95 percent or
        90 percent levels. However, the T-values on the conduct coefficients are relatively
        high and provide evidence that the negative coefficients did not occur by mere
        chance. The p-value on all conduct coefficients is less than 0.5 which suggests that
        it is more likely than not that the compensation of employees were decreased during
        the period of the agreements. In addition, the test of joint significance of the
        conduct effect shows statistical significance for both the All Employee Class and
        the Technical Employee Class.

108.   Figure 13 and Figure 15 contain the associated conduct effects from the model
        showing under-compensation for all Defendants in all years.[98]

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[98] Pixar and Lucasfilm effects have not been computed due to unavailability of stock price data.

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Figure 12: Conduct Regression with Firm-Wide Compensation Data

All-Salaried Employee Class

Observation: Firm record in each year

Dependant Variable: Log(Average Annual Compensation/CPI)

Variable	Estimate	St. Error	T-Value	P-Value
	(1)	(2)	(3)	(4)
			(1)/(2)	
Conduct_ADOBE	-0.1369 **	0.0561	-2.44	0.02
Conduct_APPLE	-0.0675	0.0552	-1.22	0.23
Conduct_GOOGLE	-0.2045 ***	0.0669	-3.06	0.00
Conduct_INTEL	-0.1401 **	0.0547	-2.56	0.02
Conduct_INTUIT	-0.0510	0.0588	-0.87	0.39
Log(Average Annual Compensation/CPI)(-1)	-0.2491 *	0.1315	-1.89	0.07
DLog(Information Sector Employment in San-Jose)	0.1529	0.2649	0.58	0.57
Log(Total Number of Transfers Among Defendants)	0.1516 ***	0.0358	4.23	0.00
Log(Number of New Hires in the Firm/Number of Employees(-1))	0.0067	0.0298	0.23	0.82
Log(Annual Average Stock Price)(-1)	0.1609 ***	0.0330	4.88	0.00
Log(Total Number of New Hires)	-0.1627 **	0.0607	-2.68	0.01
Log(Firm Revenue Per Employee/CPI) (-1)	0.3455 ***	0.0999	3.46	0.00
APPLE	-0.2395 ***	0.0819	-2.92	0.01
GOOGLE	-0.1639	0.1020	-1.61	0.12
INTEL	-0.3122 ***	0.0642	-4.86	0.00
INTUIT	-0.0817	0.0511	-1.60	0.12
Constant	9.2323 ***	0.9529	9.69	0.00
Observations	**47**			
R-square	**0.961**			
P-Value of the test for Joint Significance of Conduct Coefficients	**0.006** ***			

Note: (1) *** Significant at 1% level; ** Significant at 5% level; * Significant at 10% level

(2) Average Annual Compensation is computed as the mean of employee annual total compensation

Employee's total compensation is the sum of base annual compensation (in December), overtime pay, bonus,

and value of equity compensation granted

(3) Value of equity compensation is computed using the weighted average grant-date fair values for stock options and

restricted stock units from SEC Filings

(4) Firm Revenue Per Employee is computed as a ratio of global revenue to global number of

employees, both obtained from SEC Filings

(5) Pixar and Lucasfilm are omitted from these equations

(6) Defendant stock prices are computed as the annual average of the daily adjusted closing prices

Source: Defendants' employee compensation data; St Louis Fed Reserve; SEC Filings; Yahoo Finance

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Figure 13: Under-Compensation with Firm-Level Compensation Data

All-Salaried Employee Class

	ADOBE	APPLE	GOOGLE	INTEL	INTUIT
2005	-6.85%	-3.37%	-10.23%	-7.00%	-
2006	-11.99%	-5.90%	-17.91%	-12.26%	-
2007	-10.71%	-5.27%	-15.99%	-10.95%	-5.10%
2008	-11.03%	-5.43%	-16.47%	-11.28%	-3.83%
2009	-0.68%	-0.33%	-1.01%	-0.69%	-0.32%

Source: Regression Estimates of Firm-level Undercompensation
to All-Salaried Employee Class.

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Figure 14: Conduct Regression with Firm-Level Compensation Data (R&D)

Technical Employee Class

Observation: Firm record in each year
Dependant Variable: Log(Average Annual Compensation/CPI)

Variable	Estimate (1)	St. Error (2)	T-Value (3) (1)/(2)	P-Value (4)
Conduct_ADOBE	-0.1314 *	0.0719	-1.83	0.08
Conduct_APPLE	-0.1020	0.0731	-1.40	0.17
Conduct_GOOGLE	-0.1657 *	0.0859	-1.93	0.06
Conduct_INTEL	-0.1139	0.0704	-1.62	0.12
Conduct_INTUIT	-0.0363	0.0764	-0.48	0.64
Log(Average Annual Compensation/CPI) (-1)	-0.3001 *	0.1576	-1.90	0.07
DLog(Information Sector Employment in San-Jose)	0.0384	0.3368	0.11	0.91
Log(Total Number of Transfers Among Defendants)	0.1575 ***	0.0464	3.40	0.00
Log(Number of New Hires in the Firm/Number of Employees(-1))	0.0491	0.0403	1.22	0.23
Log(Annual Average Stock Price)(-1)	0.1537 ***	0.0390	3.94	0.00
Log(Total Number of New Hires)	-0.1883 **	0.0786	-2.39	0.02
Log(Firm Revenue Per Employee/CPI) (-1)	0.4845 ***	0.1366	3.55	0.00
APPLE	-0.3421 ***	0.1105	-3.10	0.00
GOOGLE	-0.1707	0.1303	-1.31	0.20
INTEL	-0.0807	0.0704	-1.15	0.26
INTUIT	0.0015	0.0641	0.02	0.98
Constant	9.7441 ***	1.2094	8.06	0.00
Observations	47			
R-square	0.931			
P-Value of the test for Joint Significance of the Conduct Coefficients	0.093 *			

Note: (1) *** Significant at 1% level; ** Significant at 5% level; * Significant at 10% level

(2) Average Annual Compensation is computed as the mean of employee annual total compensation

Employee's total compensation is the sum of base annual compensation (in December), overtime pay, bonus,

and value of equity compensation granted

(3) Value of equity compensation is computed using the weighted average grant-date fair values for stock options and

restricted stock units from SEC Filings

(4) Firm Revenue Per Employee is computed as a ratio of global revenue to global number of

employees, both obtained from SEC Filings

(5) Pixar and Lucasfilm are omitted from these equations

(6) Defendant stock prices are computed as the annual average of the daily adjusted closing prices

Source: Defendants' employee compensation data; St Louis Fed Reserve; SEC Filings; Yahoo Finance

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Figure 15: Under-Compensation with Firm-level Compensation Data (R&D)

Technical Employee Class

	ADOBE	APPLE	GOOGLE	INTEL	INTUIT
2005	-6.57%	-5.10%	-8.28%	-5.69%	-
2006	-11.16%	-8.67%	-14.08%	-9.68%	-
2007	-9.79%	-7.60%	-12.34%	-8.48%	-3.63%
2008	-10.20%	-7.92%	-12.87%	-8.84%	-2.54%
2009	-0.22%	-0.17%	-0.28%	-0.19%	-0.15%

Source: Regression Estimates of Firm-level Undercompensation
to Technical Employee Class.

C. **Both Dr. Murphy's and My Conduct Regression Analyses Demonstrate the Feasibility of the Regression Approach**

109. The analyses described in this report are performed for the purpose of demonstrating the availability of proof and statistical methodologies common to members of the All-Employee Class and the Technical Employee Class capable of showing that all or nearly all members of each class suffered suppressed compensation due to the agreements, and capable of quantifying that harm. I understand that discovery has not yet been completed and that further evidence might emerge that is relevant to my analysis. I reserve the right to consider any such evidence and its impact, if any, on the analysis I have proposed.

V. **Conclusion**

110. I therefore conclude that common proof, in the form of documents, data, economic theory, and statistical methodologies, is capable of demonstrating that the agreements artificially suppressed compensation of all or nearly all members of the All-Employee Class and Technical Employee Class. I conclude further that reliable

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econometric methods are capable of computing the total amount of salary
suppression caused by the agreements to Members of the All-Employee Class and
Technical Employee Class.

Edward E. Leamer, Ph.D.
Edward E. Leamer, Ph.D.
December 10, 2012

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Figure 16: Conduct Regression with Average S&P 500

Damages Model Sensitivity
Average Annual S&P 500 Price Index
All-Salaried Employee Class

Observation: Employee ID record in December of each year
Dependant Variable: Log(Total Annual Compensation/CPI)

Variable	Estimate (1)	St. Error (2)	T-Value (3) (1)/(2)
1. Conduct * Age	0.0063 ***	0.0005	13.2360
2. Conduct * Age^2	-0.0001 ***	0.0000	-13.3757
3. Conduct * Log(Number of New Hires In the Firm/Number of Employees(-1))	0.0020 ***	0.0008	2.6888
4. Conduct	-0.1462 ***	0.0101	-14.5355
5. ADOBE * Log(Total Annual Compensation/CPI) (-1)	0.7019 ***	0.0055	128.7812
6. APPLE * Log(Total Annual Compensation/CPI) (-1)	0.7360 ***	0.0027	276.8118
7. GOOGLE * Log(Total Annual Compensation/CPI) (-1)	0.4957 ***	0.0017	291.0496
8. INTEL * Log(Total Annual Compensation/CPI) (-1)	0.6767 ***	0.0024	276.7756
9. INTUIT * Log(Total Annual Compensation/CPI) (-1)	0.7009 ***	0.0058	121.2948
10. PIXAR * Log(Total Annual Compensation/CPI) (-1)	0.6874 ***	0.0055	124.2378
11. LUCASFILM * Log(Total Annual Compensation/CPI) (-1)	0.8040 ***	0.0364	22.0576
12. ADOBE * Log(Total Annual Compensation/CPI) (-2)	0.2889 ***	0.0053	54.3200
13. APPLE * Log(Total Annual Compensation/CPI) (-2)	0.2636 ***	0.0027	96.0626
14. GOOGLE * Log(Total Annual Compensation/CPI) (-2)	0.3704 ***	0.0016	225.9483
15. INTEL * Log(Total Annual Compensation/CPI) (-2)	0.2929 ***	0.0024	123.0515
16. INTUIT * Log(Total Annual Compensation/CPI) (-2)	0.2612 ***	0.0056	46.6472
17. PIXAR * Log(Total Annual Compensation/CPI) (-2)	0.1777 ***	0.0053	33.6197
18. LUCASFILM * Log(Total Annual Compensation/CPI) (-2)	0.1868 ***	0.0368	5.0733
19. Log(Age) (Years)	-0.3420 ***	0.0415	-8.2341
20. Log(Age)^2	0.0374 ***	0.0056	6.6385
21. Log(Company Tenure) (Months)	0.0011	0.0050	0.2292
22. Log(Company Tenure)^2	-0.0002	0.0006	-0.2769
23. Male	0.0031 ***	0.0005	5.6325
24. DLog(Information Sector Employment in San-Jose)	1.4161 ***	0.0156	90.8003
25. Log(Total Number of Transfers Among Defendants)	0.0699 ***	0.0023	30.1449
26. Year (trend)	-0.0015 ***	0.0005	-3.2232
27. Log(Number of New Hires In the Firm/Number of Employees(-1))	0.0082 ***	0.0009	8.9620
28. Log(Total Number of New Hires)	-0.2188 ***	0.0022	-100.3416
29. Log(Firm Revenue Per Employee/CPI) (-1)	-0.0653 ***	0.0032	-20.6351
30. DLog(Firm Revenue Per Employee/CPI) (-1)	0.1495 ***	0.0029	51.6893
31. DLog(Average Annual S&P 500 Index/CPI) (-1)	0.0283 ***	0.0042	6.7791
32. APPLE	0.0459 ***	0.0162	2.8270
33. GOOGLE	1.0149 ***	0.0174	58.3255
34. INTEL	0.1389 ***	0.0146	9.4968
35. INTUIT	0.1720 ***	0.0194	8.8857
36. LUCASFILM	0.7927 ***	0.0264	30.0816
37. PIXAR	0.0688	0.0482	1.4272
38. Location (State) Indicators	YES		
39. Constant	YES		
R-Square	**0.926**		
Observations	**508,969**		

Note: (1) *** Significant at 1% level; ** Significant at 5% level; * Significant at 10% level.

(2) Total Annual Compensation is computed as sum of base annual compensation (in December), overtime pay, bonus, and value of equity compensation granted.

(3) Value of equity compensation is computed using the weighted average grant-date fair values for stock options and restricted stock units from SEC Filings.

(4) Firm Revenue Per Employee is computed as a ratio of global revenue to global number of employees, both obtained from SEC Filings. Lucasfilm revenues were obtained from PrivCo and public sources.

(5) Observations are restricted to cases in which there was no change in employer in the previous two years.

(6) S&P 500 Index is computed as the average of the daily adjusted close values.

Source: Defendants' employee compensation data; St. Louis Fed Reserve; SEC Filings; Yahoo Finance; PrivCo and public sources.

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Figure 17: Conduct Regression with Average S&P 500 (R&D)

Damages Model Sensitivity
S&P 500 Price Index
Technical Employee Class

Observation: Employee ID record in December of each year
Dependant Variable: Log(Total Annual Compensation/CPI)

Variable	Estimate	St. Error	T-Value
	(1)	(2)	(3)
			(1)/(2)
1. Conduct * Age	0.0073 ***	0.0007	10.8468
2. Conduct * Age^2	-0.0001 ***	0.0000	-10.8864
3. Conduct * Log(Number of New Hires In the Firm/Number of Employees(-1))	-0.0111 ***	0.0010	-10.8652
4. Conduct	-0.2043 ***	0.0141	-14.4664
5. ADOBE * Log(Total Annual Compensation/CPI) (-1)	0.6785 ***	0.0073	92.8530
6. APPLE * Log(Total Annual Compensation/CPI) (-1)	0.7207 ***	0.0037	197.2983
7. GOOGLE * Log(Total Annual Compensation/CPI) (-1)	0.4390 ***	0.0022	201.3110
8. INTEL * Log(Total Annual Compensation/CPI) (-1)	0.6425 ***	0.0031	209.3370
9. INTUIT * Log(Total Annual Compensation/CPI) (-1)	0.6598 ***	0.0085	77.9206
10. PIXAR * Log(Total Annual Compensation/CPI) (-1)	0.6715 ***	0.0082	82.2910
11. LUCASFILM * Log(Total Annual Compensation/CPI) (-1)	0.8388 ***	0.0694	12.0842
12. ADOBE * Log(Total Annual Compensation/CPI) (-2)	0.3008 ***	0.0072	42.0295
13. APPLE * Log(Total Annual Compensation/CPI) (-2)	0.2554 ***	0.0038	67.3782
14. GOOGLE * Log(Total Annual Compensation/CPI) (-2)	0.3620 ***	0.0021	172.2609
15. INTEL * Log(Total Annual Compensation/CPI) (-2)	0.3159 ***	0.0030	106.0838
16. INTUIT * Log(Total Annual Compensation/CPI) (-2)	0.2944 ***	0.0082	35.9215
17. PIXAR * Log(Total Annual Compensation/CPI) (-2)	0.1046 ***	0.0075	13.9643
18. LUCASFILM * Log(Total Annual Compensation/CPI) (-2)	0.1484 **	0.0695	2.1350
19. Log(Age) (Years)	-0.5788 ***	0.0587	-9.8583
20. Log(Age)^2	0.0686 ***	0.0080	8.5921
21. Log(Company Tenure) (Months)	0.0206 ***	0.0068	3.0315
22. Log(Company Tenure)^2	-0.0016 **	0.0008	-2.0654
23. Male	0.0066 ***	0.0008	8.0584
24. DLog(Information Sector Employment in San-Jose)	1.4834 ***	0.0215	68.9315
25. Log(Total Number of Transfers Among Defendants)	0.0839 ***	0.0032	25.9499
26. Year (trend)	-0.0012 **	0.0006	-1.9713
27. Log(Number of New Hires In the Firm/Number of Employees(-1))	0.0139 ***	0.0013	11.0076
28. Log(Total Number of New Hires)	-0.2433 ***	0.0030	-81.5647
29. Log(Firm Revenue Per Employee/CPI) (-1)	-0.0417 ***	0.0043	-9.6674
30. DLog(Firm Revenue Per Employee/CPI) (-1)	0.1344 ***	0.0039	34.7738
31. DLog(Average Annual S&P 500 Index/CPI) (-1)	-0.0120 **	0.0059	-2.0435
32. APPLE	0.1156 ***	0.0245	4.7167
33. GOOGLE	1.3634 ***	0.0259	52.5895
34. INTEL	0.1430 ***	0.0219	6.5202
35. INTUIT	0.1581 ***	0.0316	5.0062
36. LUCASFILM	1.3259 ***	0.0456	29.0711
37. PIXAR	-0.0045	0.1040	-0.0429
38. Location (State) Indicators	YES		
39. Constant	YES		
R-Square	**0.873**		
Observations	**295,136**		

Note: (1) *** Significant at 1% level; ** Significant at 5% level; * Significant at 10% level.
(2) Total Annual Compensation is computed as sum of base annual compensation (in December),
overtime pay, bonus, and value of equity compensation granted.
(3) Value of equity compensation is computed using the weighted average grant-date fair values for stock options and
restricted stock units from SEC Filings.
(4) Firm Revenue Per Employee is computed as a ratio of global revenue to global number of
employees, both obtained from SEC Filings. Lucasfilm revenues were obtained from PrivCo and public sources.
(5) Observations are restricted to cases in which there was no change in employer in the previous two years.
(6) S&P 500 Index is computed as the average of the daily adjusted close values.

Source: Defendants' employee compensation data; St. Louis Fed Reserve; SEC Filings; Yahoo Finance; PrivCo and public sources.

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Figure 18: Conduct Regression with Average Defendant Stock Prices

Damages Model Sensitivity
Defendants Stock Prices
All-Salaried Employee Class

Observation: Employee ID record in December of each year
Dependant Variable: Log(Total Annual Compensation/CPI)

Variable	Estimate	St. Error	T-Value
	(1)	(2)	(3) (1)/(2)
1. Conduct * Age	0.0059 ***	0.0005	12.6097
2. Conduct * Age^2	-0.0001 ***	0.0000	-12.7988
3. Conduct * Log(Number of New Hires In the Firm/Number of Employees(-1))	0.0050 ***	0.0008	6.1651
4. Conduct	-0.1641 ***	0.0099	-16.6155
5. ADOBE * Log(Total Annual Compensation/CPI) (-1)	0.6791 ***	0.0054	126.6528
6. APPLE * Log(Total Annual Compensation/CPI) (-1)	0.7447 ***	0.0026	284.8534
7. GOOGLE * Log(Total Annual Compensation/CPI) (-1)	0.4969 ***	0.0017	294.8958
8. INTEL * Log(Total Annual Compensation/CPI) (-1)	0.6765 ***	0.0023	289.6740
9. INTUIT * Log(Total Annual Compensation/CPI) (-1)	0.7036 ***	0.0057	123.4117
10. ADOBE * Log(Total Annual Compensation/CPI) (-2)	0.3128 ***	0.0052	59.7396
11. APPLE * Log(Total Annual Compensation/CPI) (-2)	0.2563 ***	0.0027	95.2506
12. GOOGLE * Log(Total Annual Compensation/CPI) (-2)	0.3677 ***	0.0016	227.2142
13. INTEL * Log(Total Annual Compensation/CPI) (-2)	0.2933 ***	0.0023	129.1129
14. INTUIT * Log(Total Annual Compensation/CPI) (-2)	0.2640 ***	0.0055	47.7498
15. Log(Age) (Years)	-0.3530 ***	0.0409	-8.6315
16. Log(Age)^2	0.0387 ***	0.0056	6.9805
17. Log(Company Tenure) (Months)	-0.0066	0.0049	-1.3269
18. Log(Company Tenure)^2	0.0006	0.0005	1.1477
19. Male	0.0024 ***	0.0005	4.3928
20. DLog(Information Sector Employment in San-Jose)	1.5922 ***	0.0160	99.7455
21. Log(Total Number of Transfers Among Defendants)	0.1345 ***	0.0020	67.2381
22. Year (trend)	-0.0102 ***	0.0004	-29.1819
23. Log(Number of New Hires In the Firm/Number of Employees(-1))	0.0106 ***	0.0011	9.8170
24. Log(Total Number of New Hires)	-0.2832 ***	0.0023	-125.2556
25. Log(Firm Revenue Per Employee/CPI) (-1)	-0.1324 ***	0.0037	-36.0708
26. DLog(Firm Revenue Per Employee/CPI) (-1)	0.2879 ***	0.0039	74.6261
27. DLog(Firm Stock Price/CPI) (-1)	-0.0635 ***	0.0024	-26.4568
28. APPLE	0.1072 ***	0.0160	6.7153
29. GOOGLE	1.0906 ***	0.0172	63.4232
30. INTEL	0.1434 ***	0.0143	10.0217
31. INTUIT	0.1166 ***	0.0189	6.1546
32. Location (State) Indicators	YES		
33. Constant	YES		
R-Square	**0.929**		
Observations	**499,964**		

Note: (1) *** Significant at 1% level; ** Significant at 5% level; * Significant at 10% level.
    (2) Total Annual Compensation is computed as sum of base annual compensation (in December),
    overtime pay, bonus, and value of equity compensation granted.
    (3) Value of equity compensation is computed using the weighted average grant-date fair values for stock options and
    restricted stock units from SEC Filings.
    (4) Firm Revenue Per Employee is computed as a ratio of global revenue to global number of
    employees, both obtained from SEC Filings. Lucasfilm revenues were obtained from PrivCo and public sources.
    (5) Observations are restricted to cases in which there was no change in employer in the previous two years.
    (6) Firm Stock Price computed as the average of the daily adjusted close values.

Source: Defendants' employee compensation data; St. Louis Fed Reserve; SEC Filings; Yahoo Finance; PrivCo and public sources.

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Figure 19: Conduct Regression with Average Defendant Stock Prices (R&D)

Damages Model Sensitivity
Defendants Stock Prices
Technical Employee Class

Observation: Employee ID record in December of each year
Dependant Variable: Log(Total Annual Compensation/CPI)

Variable	Estimate	St. Error	T-Value
	(1)	(2)	(3)
			(1)/(2)
1. Conduct * Age	0.0068 ***	0.0007	10.1839
2. Conduct * Age^2	-0.0001 ***	0.0000	-10.2118
3. Conduct * Log(Number of New Hires In the Firm/Number of Employees(-1))	-0.0068 ***	0.0011	-6.2079
4. Conduct	-0.2093 ***	0.0139	-15.0404
5. ADOBE * Log(Total Annual Compensation/CPI) (-1)	0.6547 ***	0.0072	90.5135
6. APPLE * Log(Total Annual Compensation/CPI) (-1)	0.7255 ***	0.0036	200.5749
7. GOOGLE * Log(Total Annual Compensation/CPI) (-1)	0.4402 ***	0.0022	203.3944
8. INTEL * Log(Total Annual Compensation/CPI) (-1)	0.6492 ***	0.0029	220.4243
9. INTUIT * Log(Total Annual Compensation/CPI) (-1)	0.6566 ***	0.0084	78.0298
10. ADOBE * Log(Total Annual Compensation/CPI) (-2)	0.3255 ***	0.0071	45.9360
11. APPLE * Log(Total Annual Compensation/CPI) (-2)	0.2508 ***	0.0037	67.1304
12. GOOGLE * Log(Total Annual Compensation/CPI) (-2)	0.3647 ***	0.0021	174.9147
13. INTEL * Log(Total Annual Compensation/CPI) (-2)	0.3099 ***	0.0029	108.6765
14. INTUIT * Log(Total Annual Compensation/CPI) (-2)	0.3034 ***	0.0081	37.2460
15. Log(Age) (Years)	-0.5858 ***	0.0581	-10.0799
16. Log(Age)^2	0.0692 ***	0.0079	8.7670
17. Log(Company Tenure) (Months)	0.0133 **	0.0068	1.9736
18. Log(Company Tenure)^2	-0.0008	0.0007	-1.1196
19. Male	0.0064 ***	0.0008	7.8292
20. DLog(Information Sector Employment in San-Jose)	1.6607 ***	0.0223	74.6125
21. Log(Total Number of Transfers Among Defendants)	0.1384 ***	0.0027	50.6807
22. Year (trend)	-0.0083 ***	0.0005	-17.1490
23. Log(Number of New Hires In the Firm/Number of Employees(-1))	0.0127 ***	0.0015	8.4763
24. Log(Total Number of New Hires)	-0.3042 ***	0.0031	-97.8766
25. Log(Firm Revenue Per Employee/CPI) (-1)	-0.0889 ***	0.0051	-17.4255
26. DLog(Firm Revenue Per Employee/CPI) (-1)	0.2670 ***	0.0052	51.1627
27. DLog(Firm Stock Price/CPI) (-1)	-0.0750 ***	0.0033	-22.4884
28. APPLE	0.1724 ***	0.0242	7.1223
29. GOOGLE	1.3815 ***	0.0256	53.8927
30. INTEL	0.1377 ***	0.0216	6.3813
31. INTUIT	0.1070 ***	0.0311	3.4413
32. Location (State) Indicators	YES		
33. Constant	YES		
R-Square	**0.878**		
Observations	**290,089**		

Note: (1) *** Significant at 1% level; ** Significant at 5% level; * Significant at 10% level.
(2) Total Annual Compensation is computed as sum of base annual compensation (in December),
overtime pay, bonus, and value of equity compensation granted.
(3) Value of equity compensation is computed using the weighted average grant-date fair values for stock options and
restricted stock units from SEC Filings.
(4) Firm Revenue Per Employee is computed as a ratio of global revenue to global number of
employees, both obtained from SEC Filings. Lucasfilm revenues were obtained from PrivCo and public sources.
(5) Observations are restricted to cases in which there was no change in employer in the previous two years.
(6) Firm Stock Price computed as the average of the daily adjusted close values.

Source: Defendants' employee compensation data; St. Louis Fed Reserve; SEC Filings; Yahoo Finace; PrivCo and public sources.

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Exhibit 1
List of Additional Materials Relied Upon

Pleadings and Orders	Date
Defendants' Notice of Motion and Motion to Strike the Report of Dr. Edward E. Leamer	11/12/12
Opposition to Plaintiffs' Motion for Class Certification	11/12/12

Declarations	
Burmeister, Steven	11/12/12
Galy, Chris	11/09/12
Maupin, Michelle	11/12/12
McAdams, Lori	11/12/12
McKell, Danny	11/12/12
Morris, Donna	11/09/12
Vijungco, Jeff	11/09/12
Wagner, Frank	11/09/12

Depositions and Exhibits	Date
Leamer, Edward	10/26/12
Murphy, Kevin M.	12/03/12
Zissimos, Pamela	11/13/12

12/10/2012

Exhibit 1
List of Additional Materials Relied Upon

Expert Reports   **Date**

Expert Report of Edward E. Leamer, PhD   10/01/12

Expert Report of Professor Kevin M. Murphy, PhD   11/12/12

Publicly Available Materials

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Exhibit 1
List of Additional Materials Relied Upon

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"The Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel 2002," Nobelprize.org., December 10, 2012,
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Documents

Adobe

        ADOBE_002764 - ADOBE_002765
        ADOBE_008098 - ADOBE_008099
        ADOBE_008398 - ADOBE_008399
        ADOBE_008692 - ADOBE_008693
        ADOBE_009327
        ADOBE_016608 - ADOBE_016655

Apple

        231APPLE010841 - 231APPLE010843
        231APPLE055294 - 231APPLE055305
        231APPLE056385 - 231APPLE056386

CONFIDENTIAL

12/10/2012

Exhibit 1
List of Additional Materials Relied Upon

231APPLE081072 - 231APPLE081075
231APPLE094041 - 231APPLE094067

<u>Google</u>

GOOG-HIGH TECH-00009270 - GOOG-HIGH TECH-00009276
GOOG-HIGH TECH-00009454 - GOOG-HIGH TECH-00009458
GOOG-HIGH TECH-00036370 - GOOG-HIGH TECH-00036461
GOOG-HIGH TECH-00038253 - GOOG-HIGH TECH-00038274
GOOG-HIGH TECH-00194984 - GOOG-HIGH TECH-00194985
GOOG-HIGH TECH-00195005 - GOOG-HIGH TECH-00195007
GOOG-HIGH TECH-00195364 - GOOG-HIGH TECH-00195365
GOOG-HIGH TECH-00210276 - GOOG-HIGH TECH-00210276
GOOG-HIGH TECH-00233026 - GOOG-HIGH TECH-00233057

<u>Intel</u>

76512DOC000025 - 76512DOC000026
76512DOC000926 - 76512DOC000943
76526DOC000714
76582DOC000902 - 76582DOC000922
76616DOC005974 - 76616DOC005981

12/10/2012

Exhibit 1
List of Additional Materials Relied Upon

<u>Intuit</u>

INTUIT_003008 - INTUIT_003011

<u>Lucasfilm</u>

LUCAS00004721 - LUCAS00004753
LUCAS00035991 - LUCAS00035992
LUCAS00036013 - LUCAS00036014

<u>Pixar</u>

PIX00009271 - PIX00009272
PIX00023020 - PIX00023021